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Southern Philippines Public Perception Survey (SPPPS) Exploration and Analysis

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Southern Philippines Public Perception Survey (SPPPS) Exploration and Analysis

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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

AFP	Armed Forces of the Philippines
AOR	Area of Responsibility
ASG	Abu Sayyaf Group
BIFF	Bangsamoro Islamic Freedom Fighters
CAA	Conflict Affected Areas
CAFGU	Citizens Armed Forces Geographical Unit
COCOMS	Combatant Commands
GLM	Generalized Linear Model
GRP	Government of the Republic of the Philippines
IED	Improvised Explosive Device
JSOTF-P	Joint Special Operations Task Force – Philippines
MILF	Moro Islamic Freedom Fighters
MNLF	Moro National Liberation Front
MWG	Mindanao Working Group
NCA	National Command Authority
OEF-P	Operation Enduring Freedom – Philippines
PNP	Philippine National Police
SPPPS	Southern Philippines Public Perception Survey
TRAC	Training and Doctrine Command Analysis Center

TRADOC	Training and Doctrine Command
USPACOM	United States Pacific Command
VEO	Violent Extremist Organization

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I would especially like to thank LCDR Ben Cipperley and Dr. Ron Fricker for all of the advice and guidance regarding factor analysis as well as the linear regression modeling and corresponding R code utilized during this effort. Lastly, I would like to thank the sponsor of this effort, the Center for Army Analysis, whose generosity and guidance made this project possible.

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SECTION 1. THE SOUTHERN PHILIPPINES PUBLIC PERCEPTION SURVEY (SPPPS) EXPLORATION AND ANALYSIS PROJECT

1.1. BACKGROUND

As efforts in Afghanistan draw down, and in order to maintain the momentum gained in the past decade against terrorist and Violent Extremist Organizations (VEOs) around the world, the National Command Authority (NCA) has looked to the western Pacific as the new strategic focus and important locus of future efforts. The new strategy announced by President Obama in the fall of 2011 has been titled the "pivot to the Pacific." The fundamental goal underpinning the shift is to devote more effort to influencing the development of the Asia-Pacific's norms and rules, particularly as China emerges as an ever-more influential regional power (Manyin et al., 2012). In keeping with this new direction, the strategic guidance issued by Admiral Willard, Commander, U.S. Pacific Command (USPACOM), outlines countering transnational threats as one its primary focus areas. Specifically, it calls for U.S. Forces to work with Allies and partners to build capacity and share information to counter violent extremism, transnational crime, and proliferation of weapons of mass destruction, and to disrupt violent extremist organization networks and defeat the threats they pose (United States Pacific Command, 2012).

The primary difference, however, between President Obama's goals and those of the previous administration is in the expanded role of the military in the region. The President announced plans in November 2011 to expand military cooperation in the Philippines, among other initiatives, in order to increase the United States' influence in shaping the region (Manyin et al., 2012). Even in the face of budgetary constraints in the coming months, the President remarked, "Our new focus on this region reflects a fundamental truth – the United States has been, and always will be, a Pacific nation. As we end today's wars, I have directed my national security team to make our presence and mission in the Asia-Pacific a top priority. As a result, reductions in U.S. defense spending will not - I repeat, will not - come at the expense of the Asia-Pacific" (Obama, 2011).

This pivot, however, mostly represents an expansion of previous initiatives already in place in the region. Some papers have referred to this action as more of a rebalancing after more than a decade of focus in the Middle East. The Chief of Naval Operations, Admiral Jonathon

Greenert remarked that "the U.S. Navy has had more than 40 ships deployed to the region for the past ten years and that the U.S. would be increasing that number up to 60 ships by the end of the decade." (Linder, 2013).

In recent years, Combatant Commanders have sponsored surveys of indigenous populations in countries around the world. The purpose of these surveys is to better understand the population's attitudes about terrorism, particular groups associated with extremism, their government and government policies, as well as attitudes towards other governments including the United States. In particular, the Joint Special Operations Task Force – Philippines (JSOTF-P) has been conducting surveys in the Philippines since December 2011. They are interested in transforming this data into useful information to help guide the allocation of resources in their Area of Responsibility (AOR). Important problems include understanding how to use survey data to model the relevant populations' beliefs, attitudes, intentions and behaviors. And, an important application is modeling those indirect and asymmetric approaches designed to erode an adversary's power, influence, and will that are outlined in US doctrine.

1.2. PROBLEM STATEMENT

To analyze survey data from the Southern Philippines Public Perception Survey (SPPPS) collected under the auspices of the Joint Special Operations Task Force – Philippines (JSOTF-P) using a variety of statistical techniques to include Factor Analysis and linear regression models in order to provide key and relevant insights to the sponsor.

1.3. RESEARCH OBJECTIVE

To understand the most significant factors affecting trust in the Philippine insurgency.

1.4. CONSTRAINTS, LIMITATIONS, & ASSUMPTIONS

Constraints limit the study team's options to conduct the study.

- The project will be completed by 30 September 2013.
- The data is provided from only six locations (Basilan, Cotabato, Isabela, Marawi, Sulu, and Zamboanga).

Limitations are a study team's inability to investigate issues within the sponsor's bounds.

- The study team has no ability to impact the quality of previously collected data.

Assumptions are study specific statements that are taken as true in the absence of facts.

- The quality of data is sufficient to provide useful insights with respect to the proposed analytic techniques.
- The data is representative of a simple random sample.
- Translations into local Philippine dialects are assumed to be accurate.

1.5. APPROACH

The approach that the study team will take includes:

1) Conduct factor analysis on the data at both the micro and macro levels in order to determine and understand the underlying latent variable structure. Micro level factors are derived by combining waves 3 and 4 data by Conflict Affected Area (CAA) and then conducting factor analysis, while the macro level factors are gleaned from first combining waves 2-4 into one data set containing 9000 observations from all CAAs and then executing the factor analysis. Both "looks" will provide slightly different insights into phenomenon not directly observable via individual survey questions and provide key insights to the sponsor.

2) Fitting linear regression models, again both at the micro and macro levels, which include both temporal and spatial aspects of the survey data, in order to provide insight into how some factors affect trust in the insurgency (the response variable). The factors that result from the first step will act as both the response and explanatory variables.

1.6. STUDY TEAM

- MAJ Tom Deveans, Combat Analyst, TRAC-MTRY.
- LCDR Ben Cipperley, Student, Naval Postgraduate School.
- Dr. Ron Fricker, Professor, Naval Postgraduate School.

1.7. ORGANIZATION OF THIS DOCUMENT

The remainder of this document will focus on describing the survey instrument, fielding, data collection, and data cleaning and imputation. Chapter Two will break down how the survey was conducted in the Philippines, including concessions made for the security situation in highly contested areas. Chapter Three discusses the results of the factor analysis, including determining the appropriate type of factor analysis, calculating the number of factors, and deciding on an appropriate factor rotation. It also describes in detail the resulting factors for each conflict-affected area at the micro level, as well as the aggregated factor analysis at the macro level. Chapter Four discusses modeling the factors at the macro and micro levels for each of the conflict affected areas and the significant variables involved in a linear regression model for trust in the insurgency, and identify actionable results that JSOTF-P and the MWG can influence to potentially decrease citizen's trust in the insurgents in the six conflict affected areas. Chapter Five discusses Key Driver Analysis and the development of a comprehensive decision aid to convey the results of the factor analysis and fitted models, survey instrument recommendations, as well as opportunities for future research.

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SECTION 2. THE SURVEY DATA

2.1. BACKGROUND

Beginning in November 2011, the Mindanao Working Group (MWG) contracted with a survey company, Taylor, Nelson, and Sofres (TNS) Philippines, a subsidiary of Kantar Inc., to conduct the SPPPS in the 6 CAAs, given as Cotabato City, Isabela City, Marawi City, Sulu, Southern Basilan, and Zamboanga. Brief descriptions of the areas follow:

1) Cotabato City – Cotabato is a bifurcated city with both a strong Catholic and Muslim representation which must both be satisfied by the local government. It is described as a "fairly functional society". Checkpoints all over the city are manned by the PNP and AFP on the periphery. The area is subject to infrequent improvised explosive device (IED) attacks that cause some damage, but these are mostly intended to intimidate the population. As with all of the conflict-affected areas, corruption is rampant and somewhat tolerated, albeit not welcome.

2) Marawi City – Marawi City is described as a homogeneous society in which almost the entire population identifies as Muslim. It is largely an agrarian society with very little police presence. The justice system is a confluence of national, religious, and tribal law and frequent clan-on-clan disputes arise over land disputes. The population does not trust the Philippine government due to the belief that the state has stolen their land and robbed them of their livelihood due to the development of Lake Lanao for power generation. Both the U.S. Embassy and JSOTF-P consider the area to be high risk to U.S. personnel.

3) Isabela City – Isabela is also a bifurcated city with about half of its population identifying as Roman Catholic and the other half Muslim. It is the most developed city in Basilan, but its major concern is power generation. Currently, power barges are the only source of distribution other than individual generators. Isabela City has the potential to be rich with rubber plantations, but it suffers from a capacity to distribute the raw or even processed materials to the markets in Zamboanga City and beyond. Isabela City sees infrequent IED attacks and although kidnappings and extortion do happen, they occur at a lower rate than other conflict affected areas.

4) Jolo (Island of Sulu) – Currently the JSOTF-P main effort, the island of Sulu has a wide array of development and governance issues, but the eastern side is relatively peaceful due

to a number of strong personalities that control violence. These issues include widespread nepotism, corruption, and violence. The main city on the island is Jolo, which is the focus of the MWG. It has an airport which was funded and built by USAID. Sulu has a large AFP presence and recent operations have worked to disrupt extremist ASG and JI elements from the island.

5) Zamboanga City – Zamboanga City has diverse population in terms of religion, tribe, and even dialects spoken. It is one of the most developed conflict affected area in terms of industry, tourism, security, etc. It is home to Western Mindanao Command and some of the Philippine Air Forces. It also enjoys reliable power most of the time. Infrequent IEDs, kidnappings, extortion do occur, but at a much lower rate than other conflict-affected areas. Zamboanga City is also part of Region IX.

6) Southern Basilan – Southern Basilan is characterized by disjointed communities that the U.S. Government, including both the U.S. Embassy and JSOTF-P, have been trying to unite for several years. The southern and eastern portions of the area are characterized by corruption and violence. Southern Basilan was the initial focus of JSOTF-P during the initial phases of OEF-P. The initial push in 2002-2003 squeezed JI and ASG mostly onto Mainland Mindanao, Sulu and Tawi-Tawi. ASG continues to maintain a strong hold on the island and enjoys sanctuary provided by the MILF in many locations. The population, however, largely regards the ASG as misfit bandits, which are more criminal than ideological. Violence is frequent and is considered somewhat normal in these areas.

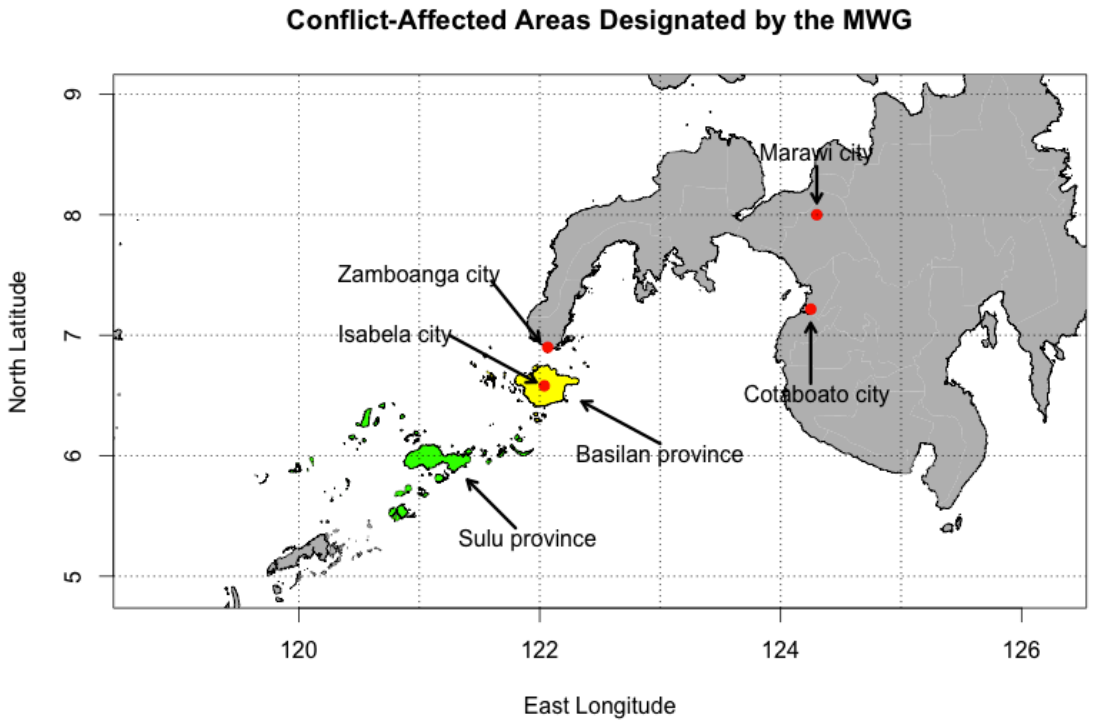


Figure 1: Conflict Affected Areas (CAAs) Designated by the Mindanao Working Group (MWG).

One of the principle directives for the SPPPS was to quantify the level of support or empathy for VEOs operating in the southern Philippines (U.S. Mission Manila, 2011). The SPPPS focuses on the six most influential separatist/insurgent groups operating in Mindanao. Specifically it collects opinion data for the ASG, JI, the NPA, the MNLF, the MILF, and the BIFF.

1) Abu Sayyaf Group – According to the National Counterterrorism Center (NCTC) 2013 Calendar, the ASG is regarded as the most violent of the Islamic separatist groups operating in the southern Philippines (National Counterterrosism Center, 2013a). It originated as a faction of the MNLF which split off in the early 1990's and now is suspected of ties to Al Qaida-linked Jemaah Islamiyah. Since that time, it has claimed responsibility for acts of terrorism across the southern Philippines including bombings, kidnappings, extortion, and assassinations. ASG is prevalent in Basilan, Sulu, and Tawi-Tawi provinces and its stated goal is to promote an independent Islamic state in western Mindanao and the Sulu Archipelago (National Counterterrosism Center, 2013a).

2) Jemaah Islamiya – JI is an Indonesia-based terrorist organization that was discovered when plans to attack the U.S. Navy were disrupted by Singaporean authorities in 2001. It further increased its notoriety when it claimed responsibility for the bombing of a nightclub in Bali in 2002 that killed more than 200 people. Its goal is to include the southern Philippines as part of a widespread Islamic state which would span Indonesia, Malaysia, southern Thailand, Singapore, Brunei, and the southern Philippines (National Counterterrosism Center, 2013b).

3) National People's Army – The NPA is one of the oldest insurgent groups operating in the southern Philippines. It was established in 1969 as the militant wing of the Communist Party of the Philippines and was modeled after the agrarian revolution in China. Its goal is to overthrow the Government of the Philippines using guerilla warfare, but the NPA lost the support of the Chinese Communist Party in 2011. In the 2000's, the Philippine Government attempted to reconcile with the NPA, but was unsuccessful after the U.S. included the NPA on its List of Foreign Terrorist Organizations (BBC News, 2012).

4) Moro National Liberation Front – The MNLF was established in 1971 with the goal of fighting the Philippine Government for the establishment of an independent Moro nation. While unsuccessful in achieving this endstate, in 1989 the Philippine Government signed a law establishing the ARMM, which gave the predominantly Muslim people in the region a degree of self-rule (BBC News, 2012). Throughout the 1990's the leadership of the MNLF gained legitimacy including signing a peace treaty with the government in 1996. Following a failed uprising in 2001, however, the group descended into violent clashes with the Philippine Armed Forces. Since 2008, the MNLF is believed to have become weaker, and many factions have splintered from the group (BBC News, 2012).

5) Moro Islamic Liberation Front – The MILF was formed in 1978 after its leader, Salamat Hashim, split from the MNLF in 1978. Today, it is considered to be the country's largest Muslim rebel group. It has been engaged in peace talks with the Philippine Government since the mid-1990's and had successfully signed a peace treaty in 2008 designating boundaries for a Muslim homeland (BBC News, 2012). This treaty, however, was declared unconstitutional and the MILF renewed fighting with the AFP. Presently, the government is negotiating a new treaty with the MILF. Provisions of this treaty include expanding the boundaries of the ARMM in exchange for decommissioning of MILF forces, a guarantee of democratic and human rights,

and the expansion of Sharia courts for Muslim residents (Muzaffar, 2012). The leadership of the MNLF, however, does not favor this agreement (Estoquia, 2012).

6) Bangsamoro Islamic Freedom Fighters – Comprised of only about 1000 fighters, the BIFF split from the MILF in 2010 with the intention largely of destroying the peace process between the MILF and the Philippine government. As a result, there have been several clashes with the MILF and the BIFF as the BIFF has attempted to gain control over MILF-held territory (Cox, 2011).

As stated above, while the main goal of this survey was to measure the perception of the level of support toward VEOs and insurgent groups in the areas, attempts were also made to measure the capacity of the Philippine Security Forces, the overall perceptions of economic conditions, governance and rule of law, and social justice and conflict mitigation in the conflict affected areas of Mindanao (U.S. Mission Manila, 2011). Since November 2011, four iterations of this survey have been completed. In order to capture and model the most relevant information, the research sponsor, the Center for Army Analysis, directed this analysis (at the micro level) to focus on the two most current waves of the SPPPS, Waves III and IV. Wave III was collected in June 2012 and Wave IV was collected in September 2012. The macro level analysis will take into account waves II – IV in order to incorporate as much of the data as possible.

2.2. SURVEY DESIGN

In order to meet the stringent requirements set forth by the MWG, TNS Philippines developed a process to collect, analyze, and present the data in such a manner as to ensure the highest degree of fidelity. They used a complex survey design, developed a detailed sampling plan to minimize the estimated margin of error, and implemented several control measures to ensure the highest degree of fidelity in the data. The survey instrument is comprised of 114 questions, each with several subparts, divided across 13 sections. Each section addresses a specific requirement as set forth in the MWG guidance. The 13 sections of the survey are:

I. Quality of Life Trends

II. General Socio-Economic Situation

III. Awareness and Trust Ratings of Institutions, Organizations, and Groups in Society

IV. Performance of the Government / Philippine Security Forces

V. Assessment of Basic Services

VI. Employment / Livelihood

VII. Credit

VIII. Governance and Politics

IX. Security Issues

X. Justice System and Social Relations

XI. Presence of the Philippines and U.S. Forces

XII. BALIKATAN Exercises

XIII. Demographics

Because this analysis focuses on modeling trust and support for VEOs, Section VII (Credit) and section VIII (Migrations) were not considered.

2.3. SAMPLE DESIGN AND SELECTION

For analysis purposes, we assumed a simple random sample. This implies that the survey sample is a perfect representation of the population for purposes of hypothesis testing which in all likelihood is probably not true. The actual complex survey design is a clustered, stratified sample and here are the descriptions of the clusters and strati. Also we probably have a quota sample based upon the requirement to interview exactly half male and half female respondents. A total of 3000 respondents were interviewed during each wave of the survey with an equal number drawn from each of the six conflict affected areas. Based upon the proportion of the sample size to the population size, TNS estimated the margins of error +/- 4% in each of the CAAs, and +/- 2% total. Using a sample spot map, interval sampling was used to draw 10 sample households using a starting street corner, which is also drawn at random. The first sample household was randomly selected from the houses nearest to that street corner. In urban environments, subsequent samples households were chosen using a fixed interval of five households; i.e. every sixth household. In rural environments, every other household was sampled (sample interval of one) (Taylor, Nelson, 2012). Once a household was selected for an interview, a respondent was chosen at random from among the adults age 18 and older living in the home using a probability selection table. In order to meet the design requirements of half male and half female respondents, only males were listed on the probability selection tables for odd-numbered interviews, and only females were listed on the probability selection tables for even-numbered interviews. In cases where no qualified respondent of the correct gender was

available, a new household was selected per the household interval sampling process until ten interviews were complete (Taylor, Nelson, 2012).

2.4. DATA RECODING

For this analysis, all data was coded in the R statistical package using the recode function in the *car* package. Following the precedent set by Moeller (2010), Rix (2011), and Kulzy (2012), data was recoded into an integer scale from positive to negative two. This scale serves two purposes. First, it allows ordinal responses to be converted into numerical values to enable modeling. Second, it enables all of the questions to be analyzed on the same scale.

In the SPPPS, data was collected using a mixture of three-point, four-point, and five-point scales. Response data was coded per the scheme shown in Table 1. To determine which response was "most desirable" we continued the Kulzy (2012) convention. Questions that fell into this category represented a positive impact for the Philippine Government, such as a respondent's level of trust in the Armed Forces, were assigned a value of positive two. Conversely, questions where the least desirable value represented a positive impact for the government were assigned a value of negative two.

	Recoded Value						
Question Scale	Most Desirable	Somewhat Desirable	Neutral	Less Desirable	Least Desirable	Don't Know	Refused
3-point	+2		0		-2	NA	NA
4-point	+2	+1		-1	-2	NA	NA
5-point	+2	+1	0	-1	-2	NA	NA

Table 1. Recoding scheme used for 3,4, and 5-point Likert scale questions.

We used a 3-point recoding scheme when the data clearly segregated into three distinct categorical responses. The 3-point scale allows for equal distance between the response categories, and respondents who answered "Don't Know" or "Refused" on any 3-point scale questions were coded as NA in preparation for imputation.

The difficulty in coding the 4-point scale responses is the comparison in value between the four categories. Because these questions employ an even number of categories, we had to

make concessions on the numerical scale to maintain distance between the responses, so there was essentially no “Neutral” or zero value in the recoding scheme.

The majority of the data used in this analysis employs a 5-point response scale. While not coded as a traditional Likert scale which ranges from “Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree”, the data does follow the bipolar positive to negative response scale. For these questions, the most desirable response from the Philippine Government’s perspective was assigned a value of positive two, and the least desirable response was assigned a value of negative two. The most-central answer was coded as zero. Like the 3-point scale, the odd number of response categories allowed for equal distance between the five recoded numerical values.

The R code, as well as the survey questions that were recoded, is given in Appendix A.

2.5. MISSING DATA IMPUTATION

Missing data occurred in the SPPPS in one of two ways. Responses were either left blank, or a respondent either refused to answer a question or replied “Don’t Know.” To deal with this issue, we considered several options. Because the data is relatively complete, we considered case-wise deletion of all of the respondents who answered “Don’t Know” or “Refused” to at least one survey question. This, process, however, was rejected on the grounds that the discarded portion of the population might affect the representativeness of the sample to the population and thus induce bias in the resulting models. In particular, case-wise deletion would result in more than 30% of the respondents in each wave being eliminated from the analysis.

In order to use as much of the raw data as possible, the primary method of dealing with missing data was to impute the missing information. Imputation is the process of replacing missing data with acceptable values based upon data from the sample. In this analysis, we used hotdeck imputation in order to best estimate to fill in the gaps. The *RANDwNND.hotdeck* function in the *StatMatch* package performs hotdeck imputation by calculating a set of donors who match a set of given criteria and then using that donor information to populate the missing responses. The respondents with missing information are called receivers. The software calculates a “distance” measurement in order to match donors and receivers. A match is

represented by the minimum distance between the two. For this analysis we elected to use the Manhattan distance.

The *RANDwNND.hotdeck* function allows alternate distance measurements, but the choice of distance did not have a measurable effect on the factor analysis results discussed in the following chapter. This set of donors, called the donor class, is created based upon a categorical identifier. For the micro level factor analysis, we elected to use Religion as the donor class identifier, meaning that in order to determine the appropriate fill for missing information, the function will select all respondents of the same religion from which to compare. In the SPPPS data, respondents identified with 40 unique religions. The *RandwNND.hotdeck* function requires at least one donor for every recipient, so we simplified the Religion category into Islam, Roman Catholic, and Other. For the macro level analysis, however, we used Location, meaning one of the six conflict affected areas, as the donor class. The next step in the process is for the function to then compare a set of match variables in order to get as much similarity to the chosen categorical characteristics as possible. We used slightly different match variables for the micro vs. macro level factor analysis, using Gender, Economic Class, Age Group, Civil Status, and Homeownership Status for the micro, and Gender, Age Group, Economic Class, Religion, and Wave for the macro analysis.

The R code and algorithm for the conduct of the imputation is given in Appendix B.

SECTION 3. FACTOR ANALYSIS

One of the major challenges with large surveys is reducing the mass of data into useful information. Another challenge with surveys aimed at understanding the human terrain, particularly when applied to irregular warfare, is that the population characteristics of interest may not be directly measured via single questions. Factor analysis helps address both of these issues.

Critics of factor analysis argue that its inherent subjectivity and flexibility allows analysts to manipulate the output. The non-unique solution of the factor loadings is often a particular focus of this criticism. However, all mathematical and statistical models can be manipulated, and most involve making numerous subjective choices (choice of variables, model parameterization, etc). In this sense, factor analysis is no different. As with those methods, and research in general, it is incumbent on the researcher to ensure his or her results are not sensitive to, or dependent on, modeling choices. That said, remember that the goal of factor analysis is to create factors that are both statistically and substantively meaningful, and the latter implies -- perhaps requires -- a degree of subjectivity.

Factor analysis is a hybrid of social and statistical science. First conceived in the early 1900s, the goal was multivariate data reduction, but data reduction of a very specific type. Essentially the idea is to explain the correlation structure observed in p dimensions via a linear combination of r factors, where the number of factors is smaller than the number of observed variables, and where the factors achieve both "statistical simplicity and scientific meaningfulness" (Harman, 1976).

Figure 2 illustrates the idea of factor analysis with six observed variables (i.e., survey question responses) that can be effectively summarized in terms of two latent variables (factors). Note that the survey question responses are observed with error (denoted by the ε_i terms) and the question responses are weighted linear combinations of the factors (where the weights are the λ_{ij}s). What factor analysis does is model the p observed variables as linear combinations of r factors, where the analyst has to pre-specify r, such that the model covariance matrix closely matches the sample covariance matrix of the observed variables.

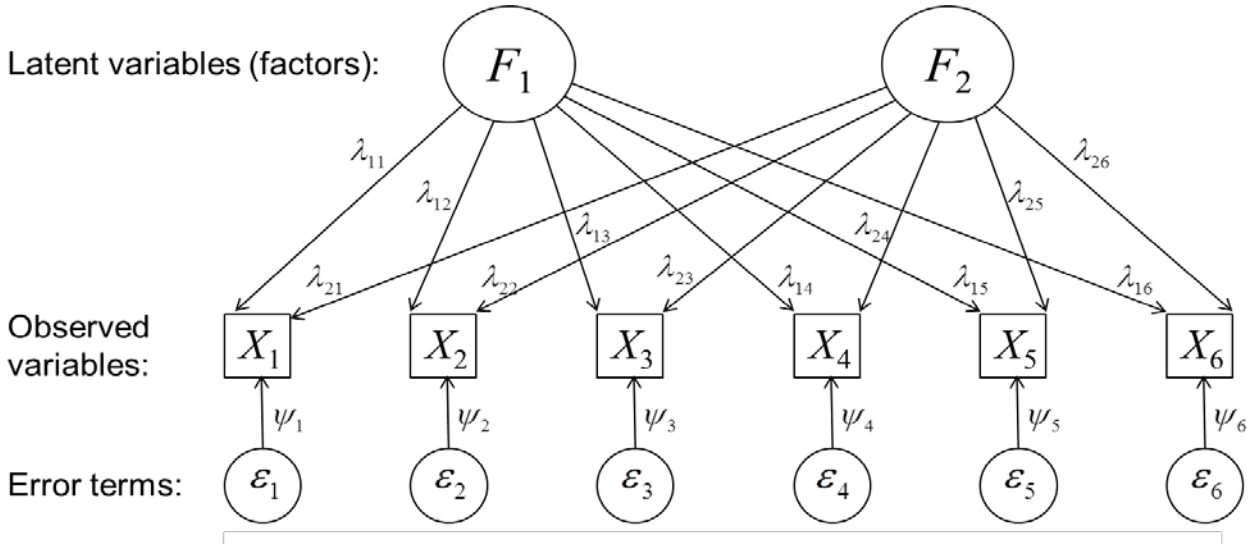


Figure 2. An illustrative example of factor analysis with six observed variables that can be effectively summarized in terms of two latent variables (factors).

An alternative to factor analysis is principal components which uses orthogonal transformations to convert a set of possibly correlated variables into a reduced set of uncorrelated variables that capture most of the variation in the original data. The transformation is defined so that the first principal component accounts for as much of the variability in the data as possible, and each succeeding component has the highest variance possible under the constraint that it be orthogonal to the preceding component or components. A principal components analysis, while useful for efficiently summarizing data, does not necessarily result in factors with scientifically meaningful interpretations (DeCoster, 1998).

In contrast, factor analysis is specifically designed to look for meaningful commonality in a set of variables (DeCoster, 1998). There are two types of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA looks to explore the data to find an acceptable set of factors. In this sense, it is much like exploratory data analysis. The goal is not so much to formally test hypotheses as it is to discover likely factors that will account for at least 50 percent of the common variation in the observed factors. CFA, on the other hand, begins with a theory or hypothesis about how the factors should be constructed and seeks to test whether the hypothesized structure adequately fits the observed data.

3.1. THE FACTOR ANALYSIS MODEL

Consider a survey consisting of *p* questions given to *n* respondents, where respondent *i*'s responses are denoted $\boldsymbol{y}_i = \{y_{i1}, \dots, y_{ip}\}$. From the data, a sample covariance matrix **S** is calculated in the usual way for the set of centered variables,

$$\boldsymbol{x}_i \triangleq \{y_{i1} - \bar{y}_1, \dots, y_{ip} - \bar{y}_p\},$$

where $\bar{y}_j = \frac{1}{n}\sum_{i=1}^{n} y_{ij}$. That is, the $j(k)^{\text{th}}$ entry of **S** is calculated as $s_{jk} = \frac{1}{n-1}\sum_{i=1}^{n} x_{ij}x_{ik}$, $j \in \{1,2, \dots, p\}$ and $k \in \{1,2, \dots, p\}$.

The fundamental assumption of factor analysis is that, for some $r < p$, each of the *p* centered variables ($\boldsymbol{X} = \{X_1, \dots, X_p\}$) can be expressed as the sum of *r* common factors ($\boldsymbol{F} = \{F_1, \dots, F_r\}$) multiplied by their loadings ($\lambda_{i1}, \dots, \lambda_{ir}$) plus a unique factor ($\boldsymbol{E} = \{\varepsilon_1, \dots, \varepsilon_p\}$) multiplied by its associated loading ($\psi_1, \dots, \psi_p$),

$$\begin{aligned} X_1 \triangleq Y_1 - \mu_1 &= \lambda_{11}F_1 + \lambda_{12}F_2 + \cdots + \lambda_{1r}F_r + \psi_1\varepsilon_1 \\ X_2 \triangleq Y_2 - \mu_2 &= \lambda_{21}F_1 + \lambda_{22}F_2 + \cdots + \lambda_{2r}F_r + \psi_2\varepsilon_2 \\ &\vdots \\ X_p \triangleq Y_p - \mu_p &= \lambda_{p1}F_1 + \lambda_{p2}F_2 + \cdots + \lambda_{pr}F_r + \psi_p\varepsilon_p \end{aligned} \tag{1}$$

where $\mu_j = \mathbb{E}(Y_j)$. Now, while the above formulation looks similar in many respects to a series of linear models, note that *everything* on the right-hand side of the *p* equations is *unobserved*. In spite of that, the goal is to estimate the loadings from the data so that the modeled covariance matrix **R** is "close to" the observed sample covariance matrix **S**.

Using matrix notation, Equation (1) can be expressed compactly as

$$\boldsymbol{X} = \boldsymbol{\Lambda F} + \boldsymbol{\Psi E}, \tag{2}$$

where **Λ** is the matrix of the loadings for the common factors of dimension $p \times r$ and **Ψ** is a matrix of dimension $p \times p$ with $\psi_1, \dots, \psi_p$ on the diagonal and all off diagonal entries zero. Assuming $\mathbb{E}(\boldsymbol{E}) = \boldsymbol{0}$, we get to the whole point in fitting the factor analysis model, which is that we can use the estimated common factor loadings $\widehat{\boldsymbol{\Lambda}}$ to express the factors in terms of their constituent parts:

$$\mathbb{E}(\boldsymbol{F}) = \widehat{\boldsymbol{\Lambda}}^{-1}\mathbb{E}(\boldsymbol{X}). \quad (3)$$

One of the most common uses of exploratory factor analysis is to "determine what sets of items hang together in a questionnaire" (DeCoster, 1998). Thus, assuming Equation 1 is an appropriate model, via Equation 3 we can determine which of the survey questions are most related and, as desired, use them to estimate the underlying latent factor for any respondent as a linear combination of their responses to the survey questions. Furthermore, if the scientific meaningfulness goal is achieved, the latent variables will have useful and interpretable meanings that provide additional insight into the characteristics of the populations being studied.

Of course, at this point it should be evident that there will be no unique solution to this problem. There are simply too many degrees of freedom in the problem formulation and, even after some assumptions to make the problem solvable, there will still be an infinite set of solutions. This, along with the fact that the choice of solution is subjective, is one of the frequent criticisms of factor analysis. Nonetheless, as we will show, we have found the results to be quite informative and useful in our survey analyses, and there are ways to minimize the number of subjective modeling choices that must be made. There are three critical steps in fitting a factor analysis model: (1) Determining the number of factors, (2) fitting the model in order to estimate the common factor loadings, and (3) rotating the loadings to find the preferred solution. We discuss each of these in turn.

3.2 DETERMINING THE NUMBER OF FACTORS

To conduct factor analysis, one must pre-specify the number of factors *r* to fit. In so doing, it is crucial not to underestimate or overestimate the number of factors. If too few factors are chosen then the fitted factors become overloaded with irrelevant variables. On the other hand, with an excessive number factors the variables may be spread out too much over the fitted factors. In either case, the result is likely to be that meaningful factors are never properly revealed.

This seems like a catch-22: To determine the correct factors, one must first know how many factors there are. However, over the years a number of solutions have been proposed, some that work better than others.

One early solution is the Kaiser rule which stipulates that the number of factors used in the model should equal the number of eigenvalues for the original data matrix that are greater than one. Another is to use a Scree plot to graph successive eigenvalues versus the number of factors and then setting *r* to the number of factors where the plotted line visually levels out (indicating that the remaining factors have little explanatory power).

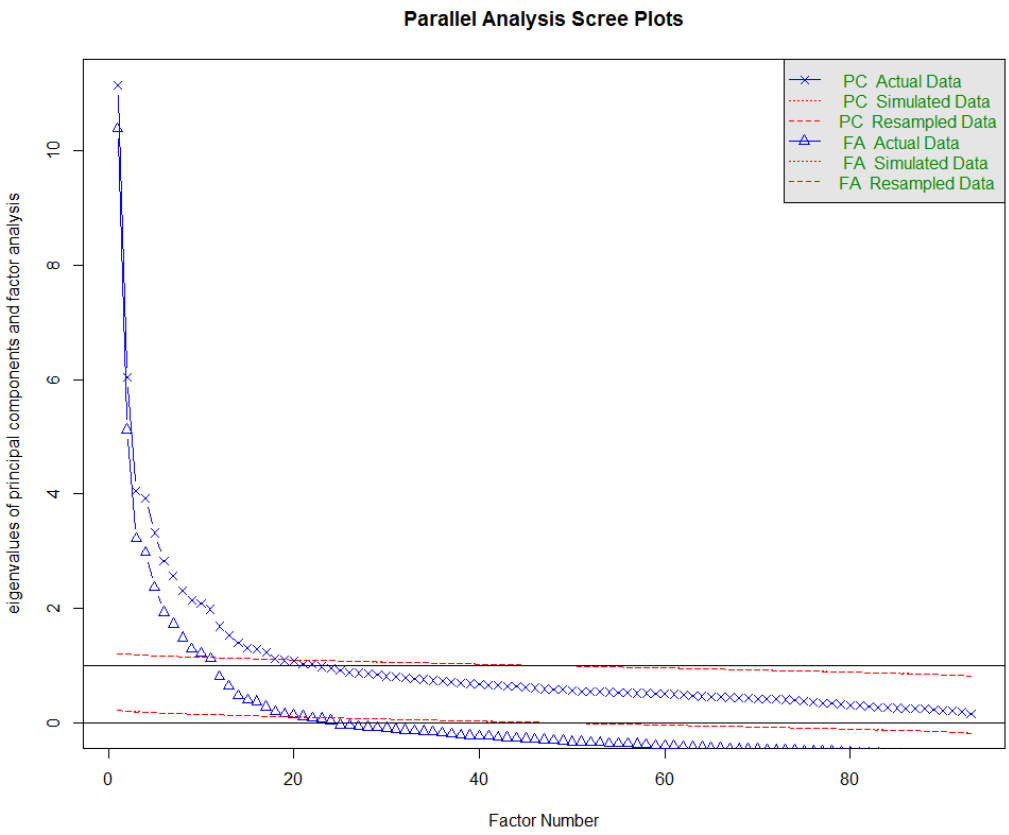


Figure 3. Example Scree Plot that shows 19 factors as the "correct" choice.

The difficulty with the Kaiser rule and the Scree plot is they are heuristics. The Kaiser rule was designed to help the analyst of the early- to mid-1900s get "into the ballpark" with respect to an acceptable number of factors, but then the analyst was supposed to further refine the acceptable number of factors through trial and error. The Scree plot is also a heuristic because it allows for subjectivity in interpreting the plotted line where, to determine the number of factors, the analyst must visually determine when the line in the Scree plot levels out.

An alternative to these methods, which only became feasible with the widespread availability of significant computing power, is parallel analysis. Parallel analysis involves the

construction of multiple correlation matrices from simulated data, where the average eigenvalues from the simulated correlation matrices are then compared to the eigenvalues from the real data correlation matrix. The idea of parallel analysis is that factors derived from the real data should have larger eigenvalues than equivalent factors derived from repeatedly resampled or simulated data of the same sample size and number of variables. Then *r* is set to the number of factors in the actual data that are greater than the average of the equivalent simulated data factor eigenvalues (Hayton, Allen, & Scarpello, 2004).

3.3. FITTING THE MODEL

Given that by definition $\mathbb{E}(\boldsymbol{X}) = \mathbf{0}$, and assuming that the common factors are independent of the unique factors, it is straightforward to show that the covariance matrix for **X** from Equation 2 is

$$\boldsymbol{R} = \boldsymbol{\Lambda R_F \Lambda'} + \boldsymbol{\Psi}^2, \tag{4}$$

where $\mathbf{R}_F$ is the covariance matrix of the factors (Mulaik, 2009). Further assuming that $\mathbb{E}(\boldsymbol{F}) = 0$ and $cov(\boldsymbol{X}) = \boldsymbol{I}$, where the former condition follows because the factors can always be rescaled and the latter because we assume the factors are independent, Equation 4 simplifies to

$$\boldsymbol{R} = \boldsymbol{\Lambda\Lambda'} + \boldsymbol{\Psi}^2. \tag{5}$$

Then from Equation 5, **Λ** and **Ψ** are estimated via maximum likelihood.

Note that the maximum likelihood estimators (MLEs) are not analytically derivable and must be solved for numerically using an iterative approach. Under the assumption that **F** and **E** are jointly normally distributed, the calculations essentially follow the usual estimation methods with an additional uniqueness condition added because of the indeterminacy of the factor analysis model.

3.4. CHOOSING THE PREFERRED ROTATION

Maximum likelihood estimation results in a non-unique solution for how the variables load onto the factors. That is, for any estimated common factor loading matrix $\widehat{\boldsymbol{\Lambda}}$ there are infinitely many other matrices that will fit the observed sample covariance matrix **S** equally well since

$$\widehat{\boldsymbol{\Lambda}}\boldsymbol{F} = \widehat{\boldsymbol{\Lambda}}\boldsymbol{T}\boldsymbol{T}^{-1}\boldsymbol{F} = \boldsymbol{\Lambda}^{*}\boldsymbol{F}^{*}, \tag{6}$$

where $\boldsymbol{\Lambda}^{*} = \widehat{\boldsymbol{\Lambda}}\boldsymbol{T}$ and $\boldsymbol{F}^{*} = \boldsymbol{T}^{-1}\boldsymbol{F}$ for some transformation matrix **T**.

Thus, after an initial solution is found, the final step in factor analysis is to rotate the variables to simplify their factor loadings. The rotation process is critical to factor analysis because it allows the analyst to identify the desired factor constructs, usually in terms of a simple structure of substantively interesting variables. However, this procedure is susceptible to criticism because all rotations are mathematically equivalent and thus the final choice is subjective.

There are two main types of rotation: (1) oblique, and (2) orthogonal. Orthogonal rotation is most commonly associated with what is called the "varimax" method, and oblique rotations are most commonly associated with what is called the "promax" method. The distinction between the two rotations is whether the factors are assumed to be correlated or not; orthogonal rotations are uncorrelated while oblique rotations may be correlated. Kline says the most accepted method for creating factors with simple structure is varimax (Kline, 1994). On the other hand, the oblique method is recommended by Costello & Osborne because it can account for both correlated and uncorrelated factors (Costello & Osborne, 2005). We used the varimax rotation on our survey data and found it to work well. As defined in Johnson & Wichern, the varimax procedure finds an orthogonal transformation matrix **T** that maximizes

$$V = \sum_{j=1}^{r}\left[\sum_{i=1}^{p}\tilde{\lambda}_{ij}^{4} - \frac{1}{p}\left(\sum_{i=1}^{p}\tilde{\lambda}_{ij}^{2}\right)^{2}\right], \tag{7}$$

where $\tilde{\lambda}_{ij} = \hat{\lambda}_{ij}/\sqrt{\sum_{j=1}^{r}\hat{\lambda}_{ij}^{2}}$ (Johnson & Wichern, 2002). Equation 7 is akin to calculating the sum of the variances of the factor loadings across the *r* factors. What varimax does is find the rotation that makes the high loadings as high as possible while simultaneously making the low loadings as low as possible on each factor. In this project, we will use only varimax.

3.5. FACTOR ANALYSIS OF THE SPPPS DATA

The factor analysis models are derived in order to help answer, from both a micro as well as a macro perspective, the research question of what are the key factors that most affect trust in the Philippine insurgency. The micro level factor analysis will create six different factor

constructs, one for each conflict affected area, combining waves III and IV. The product of this action is that the factors are built from 1,000 observations per conflict-affected area, effectively removing the (potential) temporal effect of modeling 500 observations collected 90 days apart. This decision is further supported by an independent assessment of factor trends showing almost no change between the two waves. The macro level factor analysis imposes a common factor structure across location and time, building a single set of factors by combining waves II – IV across all 6 locations into a single data set consisting of 9,000 observations, and subsequently conducting the factor analysis.

To build the factors, at both the micro and macro levels, we established several rules in order make the results as interpretable as possible. First, we established a minimum correlation for a question to load onto a factor. There are several opinions discussing the proper cutoff point to use for a minimum correlation, but we elected to use Kulzy's (2012) convention and consider questions whose loadings are greater than 0.4 or less than -0.4. The greater the loading, the more the variable is a pure measure of the factor, and the choice of the cutoff for size of loading to be interpreted is a matter of researcher choice (Tabachnik & Fidell, 2007), though 0.4 is considered "fair" (Comrey & Lee, 1992). Additionally, we did not allow a question to load onto multiple factors, and eliminated questions from a factor that were irrelevant based upon the overwhelming composition of that particular factor. We subsequently performed sensitivity analysis on the proposed number of factors using the *factanal* function from the psych package by varying the number of factors by two in each direction while looking at the output for differences in factor composition. Because of the moderately high factor loading cutoffs, varying the number of proposed factors did not cause a significant departure from the recommended number.

While the individual factor loadings are informative, the purpose of the factor analysis is to determine how the data conforms to the estimated latent variable structure. We will subsequently show the results of the factor analysis for each conflict affected area and demonstrate how the factor scores now represent the raw data. Additionally, it highlights unique aspects of the factors in each conflict-affected area, and how they may be interpreted to determine the local population's level of support to either the insurgency or the government.

The factor scores are the result of multiplying each area's factor loadings by the original data matrix. In Zamboanga, for example, using the combined Wave III/IV data, the data (minus

demographics) is 1000 respondents x 133 questions. The factor loadings matrix is 133 questions x 15 factors. This is a sparse matrix with the only non-zero values being the factor loadings which satisfy the +/- 0.4 cutoff. After multiplying the two matrices, the data matrix is now 1000 x 15, representing only the loaded factors as factor scores. The values for any entry in the matrix, however, are not comparable because of the different number of questions for each factor. At the conclusion of the modeling phase, in order to have meaningful and interpretable results that were easily conveyed to a decision maker, we scaled the data so that the resulting sign and magnitude of the regression coefficients were directly comparable against each other. We accomplished this rescaling by dividing the total factor score by the number of non-zero entries in the factor loadings matrix, which represents the number of questions in that factor. The result of this action is that the coefficients scaled back to the original +/- 2 scale.

3.5.1. Micro Level Analysis

Table 2 shows the number of factors we used in the micro level analysis after the rules described above were applied.

Number of Factors by Location			
CAA	Wave III	Wave IV	Combined Waves
Cotabato	12	11	13
Isabela	13	12	14
Marawi	10	11	12
Southern Basilan	12	11	14
Sulu	10	12	13
Zamboanga	12	14	15

Table 2: Proposed Number of factors for each conflict affected area.

A complete list of factors and their respective loadings is found in Appendix D. The factors appear to be remarkably consistent across both waves indicating that the underlying factor structure is valid. In addition, the factors can be grouped together into three general

categories; common factors with common constructs, common factors with unique constructs, and unique factors.

Common factors with common constructs refer to those factors in each of the conflict affected areas that grouped together with more than 80% similar component questions. In general, eight of the factors emerged across all six conflict-affected areas as common factors with common constructs. They are *Trust in/Performance of the GRP*, *Trust in/Performance of the AFP*, *Trust in/Performance of the PNP*, *Trust in/Performance of the Citizens Armed Forces Geographical Unit (CAFGU) Government Corruption*, *Confidence in Government Institutions*, *Approval of Family Members Joining the Government/Military*, *Satisfaction with Basic Services*, and *Safety Provided by Lesser Groups*. One interesting phenomenon is how in Cotabato City, the *Trust in/Performance of the GRP*, *Trust in/Performance of the AFP*, and *Trust in/Performance of the PNP* combined to form a single factor with 45 component questions. This did not occur in any other of the conflict-affected areas. It suggests that in Cotabato, the population views these three organizations as a single unit whereas in the other surveyed locations, each organization is viewed independently of the other two. Despite this difference, we elected to consider these three factors as having a common construct due to their near identical factor loading for the other five conflict-affected areas.

The second subset of factors derived from the factor analysis is common factors with unique constructs. These factors are *Trust in Insurgency*, *Threats to Peace*, and *Approval of Family Members Joining the Insurgency*. These are factors that appear in most, if not all, of the survey locations, but they are too varied in their component questions to be considered to have a common construct. This can be a result of one of two phenomenon. First, if the awareness of a certain insurgent group was not high enough to be considered in a given survey area, it was eliminated from the data set in order to avoid excessive imputation. Second, if the correlation of a given question with a factor was not high enough to meet the 0.4/-0.4 threshold, it was eliminated from the factor construct. Three of the common factors across the six survey areas met the criteria to be a common factor with a unique loading.

The last and smallest subset of factors is unique factors. These are the relatively few instances of single factor identification where a unique factor emerges either for a single, or at most two, conflict-affected areas. Some are easy to interpret based upon their loadings, but most

do not conform to a simple interpretation. They do, however, contribute to the model building process and therefore we retained them in their original form.

3.5.1.1 Cotabato Factors

The factor analysis for Cotabato resulted in 12 interpretable factors as shown in Table 3. Of these 12 factors, seven were Common Factors with Common Constructs, three were Common Factors with Unique Constructs, and the three remaining factors were Unique Factors. As discussed above, one of the Unique Factors was a result of all of the questions concerning the level of trust and performance of the Philippine government, AFP, and PNP all grouped together into a single factor, which we named *Trust in/Performance of the GRP, AFP, and PNP*.

Resulting Factors for Cotabato	
1	Performance of the Philippine Government, Armed Forces, Police
2	Trust in the Philippine Government
3	Trust in the AFP
4	Government Corruption
5	Confidence in Government Institutions
6	Threats to Peace
7	Trust in Insurgency
8	Approval of Family Members Joining the Insurgency
9	Trust in/Performance of the CAFGU
10	Satisfaction with Basic Services
11	Approval of Family Members Joining the Government/Military
12	Safety Provided by Lesser Groups

Table 3. Factor Analysis Results for Cotabato. The dark shaded region of the tables indicates common factors with common loadings, the lighter shaded region indicates common factors with unique loadings, and the unshaded region indicates unique factors.

Additionally, I looked at how the raw survey data was now represented by the factors in each conflict-affected area. Figure 4 shows a boxplot of each factor in Cotabato. Analysis of this plot shows that all of the factor means are positive. Additionally, the lower

quartile is still positive for all but two factors, Trust in Insurgency and Trust in/Performance of the CAFGU. Looking deeper at the Trust in Insurgency factor, the average feeling of the Cotabato population toward trust in the insurgency is slightly better than neutral at 0.11 with a variance of 0.43. With a sample size of 1000, a 95% confidence interval for the mean value is [0.08, 0.16]. Although the confidence interval does not contain zero, it may indicate that there is not a strong enough popular consensus for Trust in Insurgency in either the positive (low trust) or negative (high trust) direction.

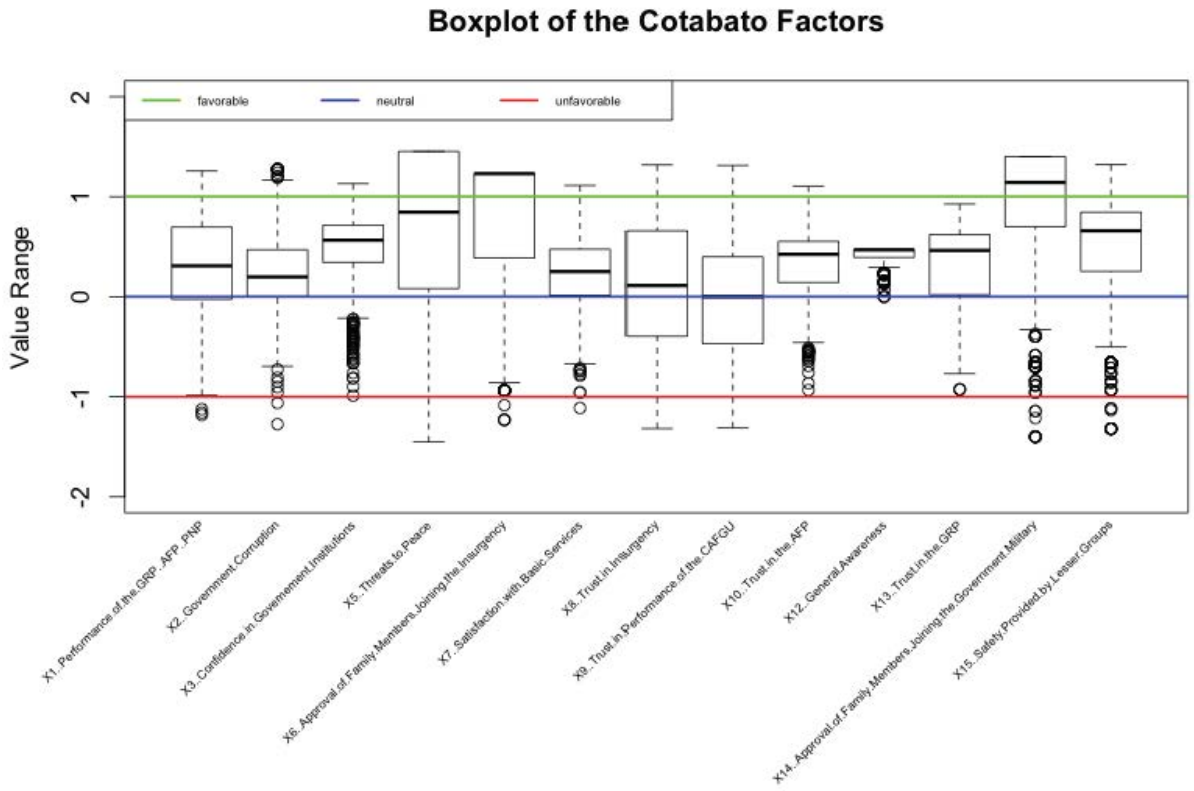


Figure 4. Boxplot of the Cotabato Factors.

3.5.1.2. Isabela Factors

The factor analysis in Isabela resulted in 14 factors as shown in Table 4. Eight factors were Common Factors with Common Constructs, three were Common Factors with Unique Constructs, and three were Unique Factors. Isabela was the only conflict-affected area for which a *Confidence in Religious Leaders/Non-Governmental Orgnanizations (NGOs)* emerged.

Resulting Factors for Isabela City	
1	Trust in/Performance of the Philippine Government
2	Trust in/Performance of the Armed Forces of the Philippines
3	Trust in/Performance of the Philippine National Police
4	Government Corruption
5	Trust in Insurgency
6	Threats to Peace
7	Confidence in Government Institutions
8	Trust in/Performance of the CAFGU
9	Satisfaction with Basic Services
10	Approval of Family Members Joining the Government/Military
11	Approval of Family Members Joining the Insurgency
12	Confidence in Religious Leaders/NGOs
13	Awareness of Al-Qaida and its Affiliates
14	Overall Awareness

Table 4. Factor Analysis Results for Isabela.

From the boxplot of the factors in Figure 5, it appears that the level of public opinion toward the GRP, AFP, and PNP is relatively favorable, and that the value for Trust in Insurgency is high. In fact, Isabela's Trust in Insurgency factor has the highest value and smallest variance of any of the six conflict-affected areas. A 95% confidence interval for the mean of the factor is [1.21, 1.27], potentially indicating that Isabela is fairly stable and possibly only a sustaining effort is required to maintain this favorable opinion. This also implies that money and other resources could be better applied in a less-favorable location.

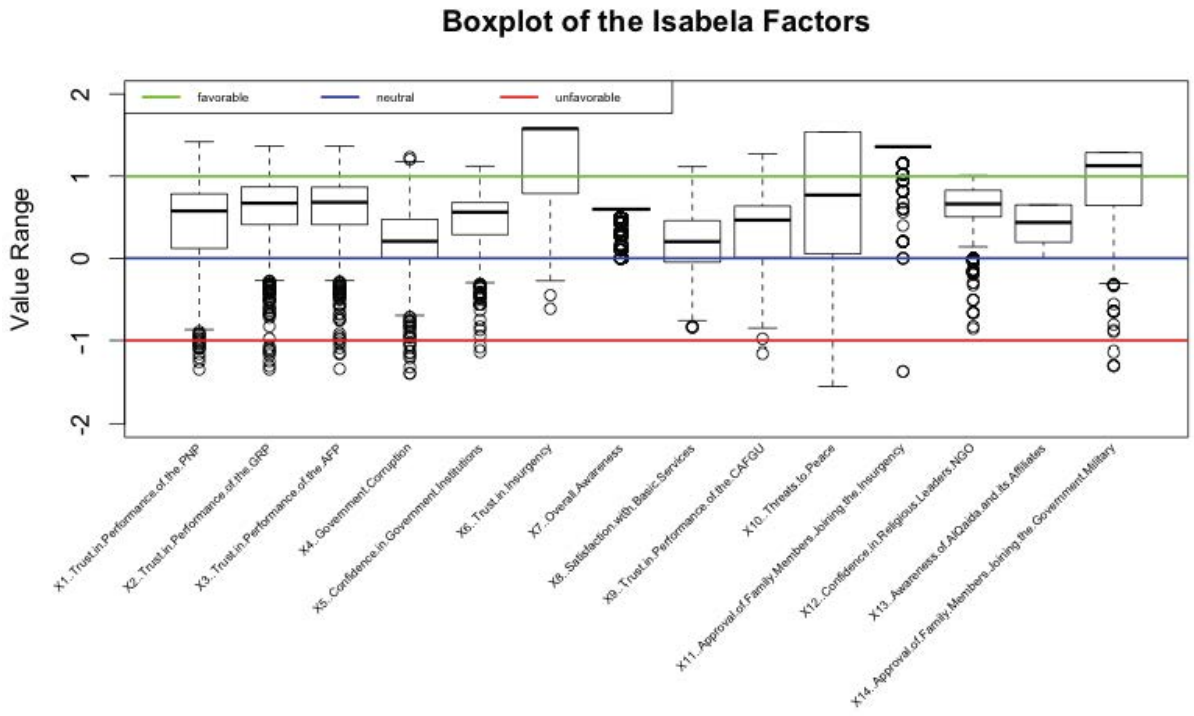


Figure 5. Boxplot of the Isabela Factors

3.5.1.3. Marawi Factors

The factor analysis for Marawi resulted in only 12 factors. The most interesting aspect of the factor analysis in Marawi is the grouping of the *Trust in Insurgency* questions together with the *Approval of Family Members Joining the Insurgency* questions into a single factor. The *Trust in Insurgency/Approval of Family Members Joining the Insurgency* is comprised of the questions concerning the BIFF, the MILF, and the MNLF as seen in Table 5. As discussed above, even though the ASG and the NPA were part of the analysis for this area, neither group emerges as part of the combined factor. This does not indicate a lack of support for either group in Marawi, only that the correlation with this factor is not strong enough for these groups to hang together on the same factor with the other three. The implications of this grouping to the MWG and JSOTF-P are discussed below.

Resulting Factors for Marawi	
1	Trust in/Performance of the Philippine Government
2	Trust in/Performance of the Armed Forces of the Philippines

3	Trust in/Performance of the Philippine National Police
4	Government Corruption
5	Threats to Peace
6	Confidence in Government Institutions
7	Trust in/Performance of the CAFGU
8	Satisfaction with Basic Services
9	Approval of Family Members Joining the Government/Military
10	Approval of Family Members Joining the Insurgency
11	Trust in Lesser Groups
12	Overall Awareness

Table 5. Factor Analysis Results for Marawi.

The 95% confidence interval for mean of the *Trust in Insurgency/Support to Family Members* response variable is [-0.11, -0.06]. This negative value indicates that the overall feeling of the population toward trust in the insurgency leans in the direction of the insurgency, but is very close to neutral. Additionally, the variance for this factor is relatively high compared to the other six conflict-affected areas. This corresponds directly to the assessment from Section 1 that the population is not friendly toward the government and its representatives. With the relatively small magnitude of the mean value, however, Marawi is similar to the other conflict-affected areas in that the population's opinion is vulnerable to influence in either direction. The slightly negative value for the mean response for *Trust in Insurgency* is in contrast, however, to the fact that the mean and lower quartile responses for the *Trust in/Performance of the AFP* and *Trust in/Performance of the PNP* factors are positive as seen in Figure 6. The mean response for *Trust in/Performance of the GRP* is positive, but the lower quartile is slightly below zero. This seemingly contradictory condition may be an artifact of the way the factors are formed, however, in that only two (questions seven and 15) of the 18-19 questions for each group address trust while the rest address the ability of these groups to perform their assigned missions.

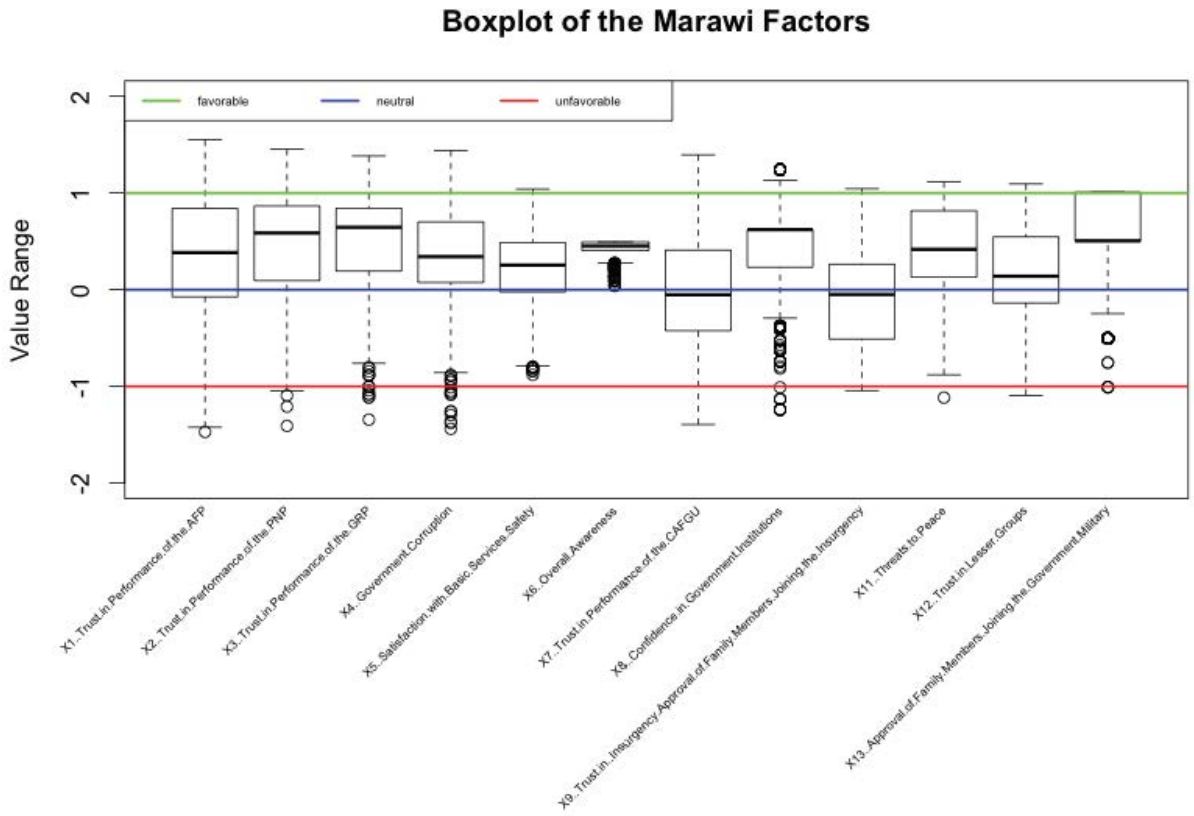


Figure 6. Boxplot of the Marawi Factors.

3.5.1.4. Southern Basilan Factors

Southern Basilan has one of the largest numbers of factors at 15. Nine of the factors are Common Factors with Common Constructs, three are Common Factors with Unique Constructs, and three are Unique Factors. One of the Unique Factors is *Fairness of the Courts*. This factor only appeared twice across all six conflict-affected areas. The other area that had a *Fairness of the Courts* factor was Zamboanga.

Resulting Factors for Southern Basilan	
1	Trust in/Performance of the Philippine Government
2	Trust in/Performance of the Armed Forces of the Philippines
3	Trust in/Performance of the Philippine National Police
4	Government Corruption

5	Threats to Peace
6	Confidence in Government Institutions
7	Trust in/Performance of the CAFGU
8	Satisfaction with Basic Services
9	Approval of Family Members Joining the Government/Military
10	Trust in Insurgency
11	Approval of Family Members Joining the Insurgency
12	Safety Provided by Lesser Groups
13	Trust in Lesser Groups
14	Awareness of Al-Qaida and its Affiliates
15	Fairness of the Courts

Table 6. Factor Analysis Results for Southern Basilan.

The mean value for the *Trust in Insurgency* factor in Southern Basilan is moderately favorable with a 95% confidence interval for the mean of [0.70, 0.75]. This moderately high value indicates an overall opinion that does not support the insurgency. Moderately high positive ratings for *Trust in/Performance of the GRP*, *Trust in/Performance of the PNP*, and *Trust in/Performance of the AFP* as shown in Figure 7 also indicate that the population's opinions are generally favorable toward the government.

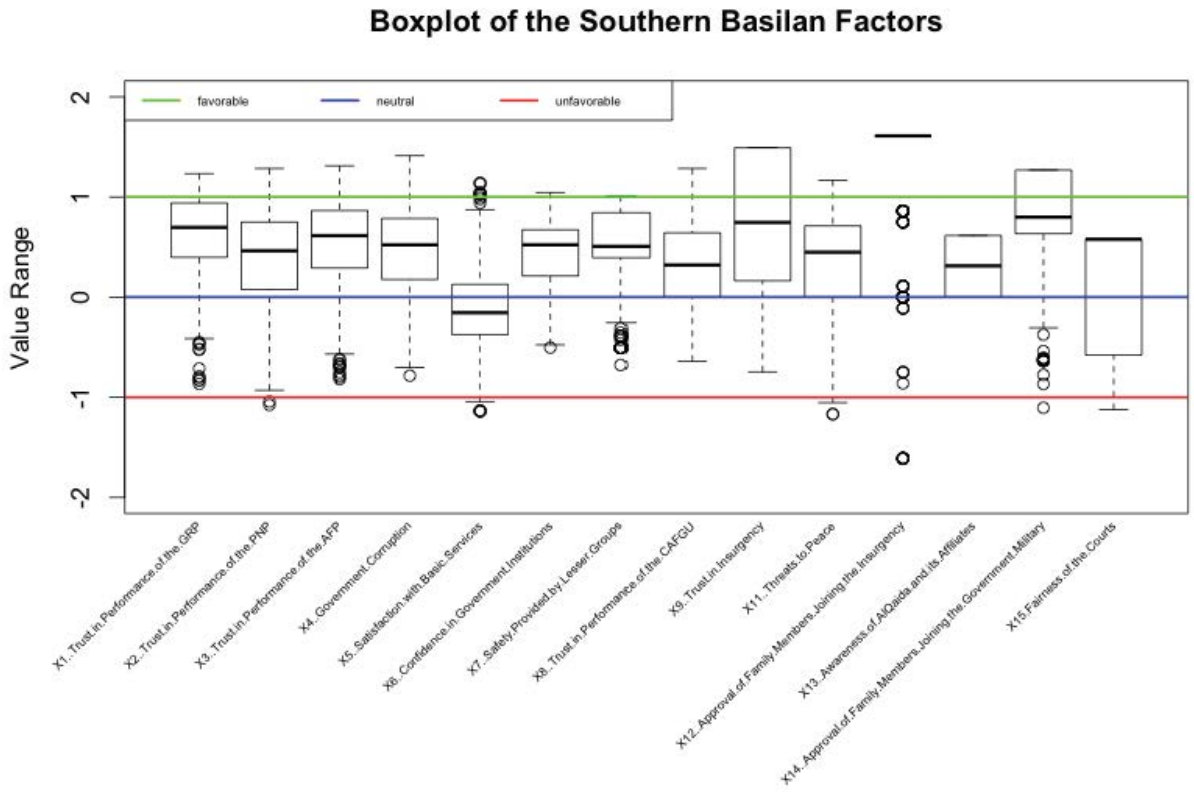


Figure 7. Boxplot of the Southern Basilan Factors.

3.5.1.5. Sulu Factors

The factor analysis in Sulu resulted in 12 factors. Nine of the factors were Common Factors with Common Constructs, two of the factors were Common Factors with Unique Constructs, and one factor was a Unique Factor. Sulu is the only one of the six conflict-affected areas which did not have an *Approval of Family Members Joining the Insurgency* factor. This is most likely because the correlation between the different insurgent groups in Sulu was not high enough to form a factor.

Resulting Factors for Sulu	
1	Trust in/Performance of the Philippine Government
2	Trust in/Performance of the Armed Forces of the Philippines
3	Trust in/Performance of the Philippine National Police

4	Government Corruption
5	Threats to Peace
6	Confidence in Government Institutions
7	Trust in/Performance of the CAFGU
8	Satisfaction with Basic Services
9	Approval of Family Members Joining the Government/Military
10	Trust in Insurgency
11	Safety Provided by Lesser Groups
12	Awareness of Al-Qaida and its Affiliates

Table 7. Factor Analysis Results for Sulu.

The average feeling of the Sulu population toward trust in the insurgency is moderately high with a 95% confidence interval for the mean of [0.32, 0.38] indicating that overall the population of Sulu does not support the insurgency, but it also can still considered to be a vulnerable population. It has moderately high positive ratings for *Trust in/Performance of the GRP*, *Trust in/Performance of the PNP*, and *Trust in/Performance of the AFP* with comparatively small amounts of variability, as shown in Figure 8, which indicate the population does have favorable opinions of these groups.

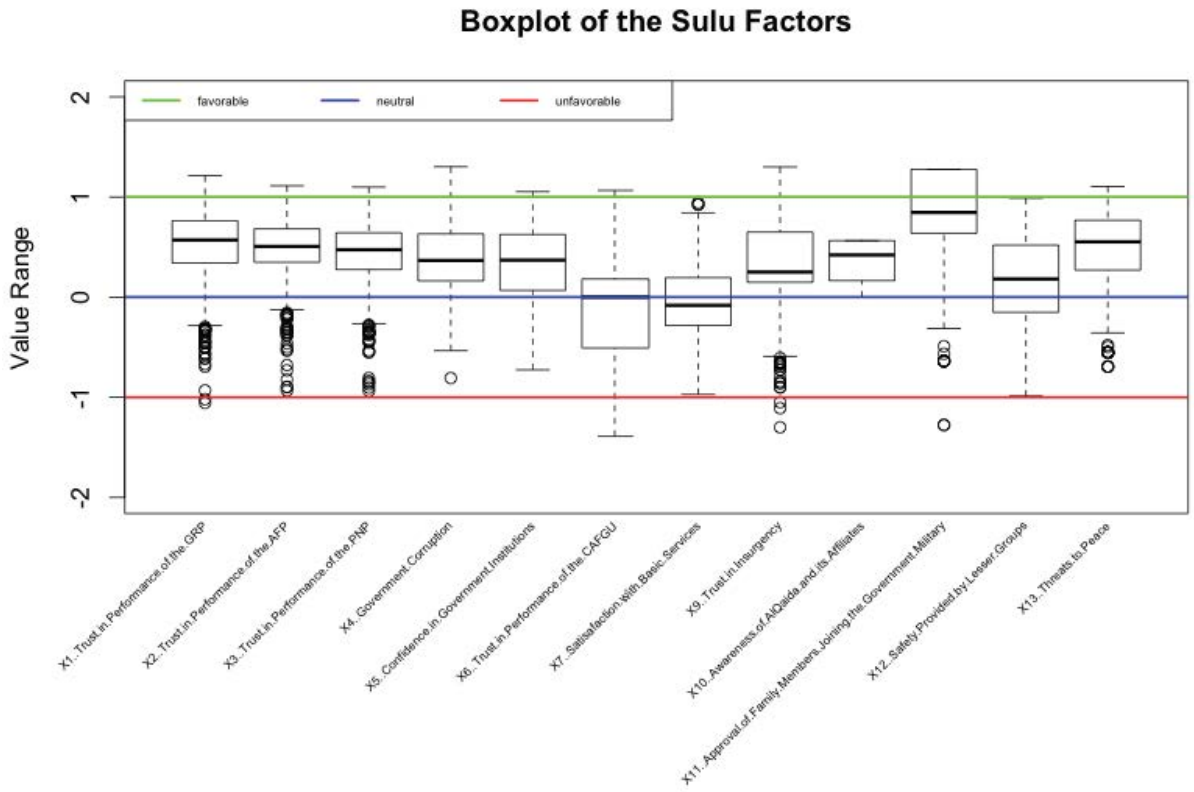


Figure 8. Boxplot of the Sulu Factors.

3.5.1.6. Zamboanga Factors

In Zamboanga, nine of the factors are Common Factors with Common Constructs, three are Common Factors with Unique Constructs, and two are Unique Factors. As discussed above, only Southern Basilan and Zamboanga formed a *Fairness of the Courts* factor.

Resulting Factors for Zamboanga	
1	Trust in/Performance of the Philippine Government
2	Trust in/Performance of the Armed Forces of the Philippines
3	Trust in/Performance of the Philippine National Police
4	Government Corruption
5	Threats to Peace
6	Confidence in Government Institutions
7	Trust in/Performance of the CAFGU

8	Satisfaction with Basic Services
9	Approval of Family Members Joining the Government/Military
10	Approval of Family Members Joining the Insurgency
11	Trust in Insurgency
12	Safety Provided by Lesser Groups
13	Trust in Lesser Groups
14	Fairness of the Courts

Table 8. Factor Analysis Results for Zamboanga.

The average feeling of the Zamboanga population toward trust in the insurgency is moderately high with a 95% confidence interval for the mean of [0.85, 0.92] indicating that overall the population of Sulu does not support the insurgency. The area also has moderately high positive ratings for *Trust in/Performance of the GRP*, *Trust in/Performance of the PNP*, and *Trust in/Performance of the AFP* as shown in Figure 9 indicating that this measurement is not an artifact of the factor analysis and that the opinion of the population toward the insurgency can indeed be perceived as favorable from the government's point of view.

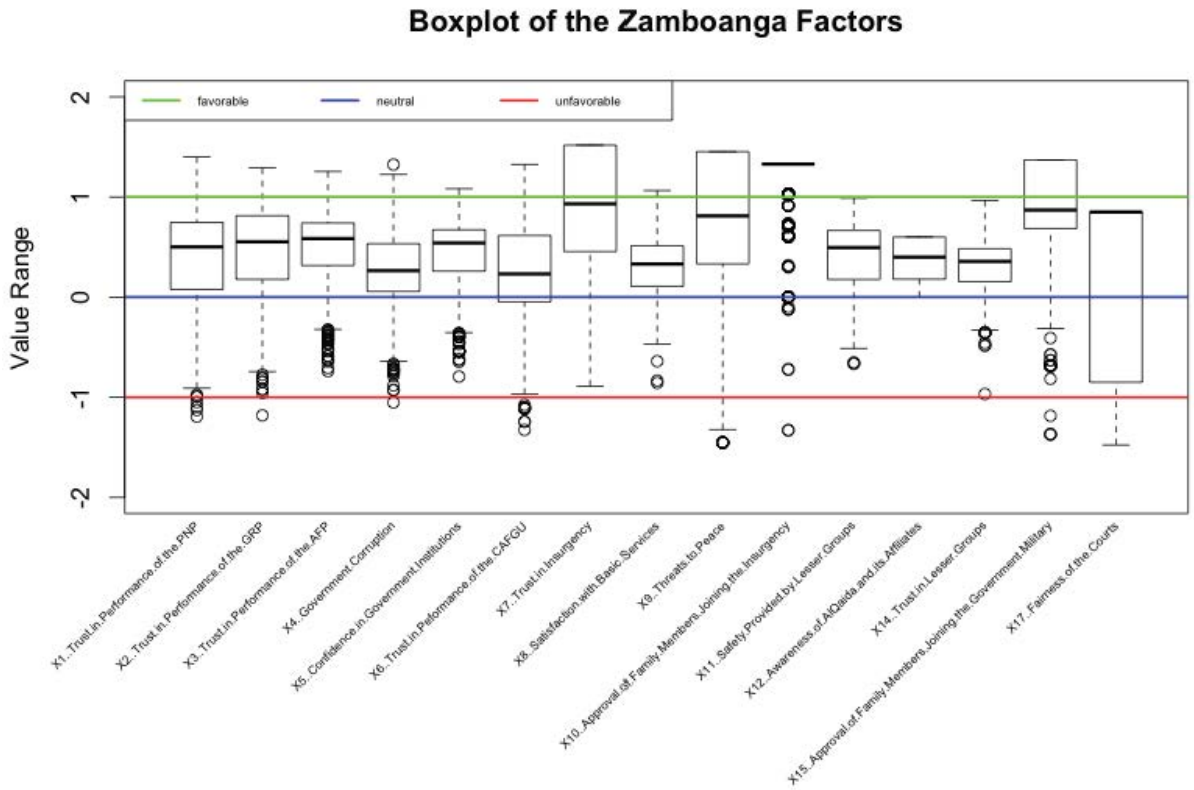


Figure 9. Boxplot of the Zamboanga Factors.

3.5.2. Micro Level Factor Analysis Summary

It is clear that factor analysis provides unique perspectives on how the local population perceives the government and the insurgency that were previously undetectable in the raw survey data. The results of the factor analysis are best interpreted in the context of the decision maker. Based upon the purpose and scope of the SPPPS, there are two decision makers involved. At the strategic level, the MWG and the U.S. Embassy are responsible for advising and influencing the Philippine government in both international relations and domestic policy, while at the operational level, JSOTF-P is responsible for aiding and assisting the AFP and PNP in reaching out to the population and presenting a competent and confident military and police force. Because of this distinction, we evaluated each model and determined which factors were actionable at their respective levels. The term actionable refers to those factors which are subject to direct and indirect influence by either the MWG or JSOTF-P. The remainder of the analysis

focuses on the median value of the factors instead of the mean value. This is important because counterinsurgency doctrine focuses effort on the typical resident. Because of the distribution of responses within each category is more than likely asymmetric and the factor scores can be sensitive to outliers, medians give a better indication of the typical population opinion.

At the strategic level, we assessed the effects of the *Government Corruption* and the *Confidence in Government Institutions*. These two factors consist of national and provincial-level government organizations and therefore are mostly actionable through diplomatic strategy changes and policy recommendations. Figure 10 attempts to graphically consolidate the factor analysis results for *Government Corruption* and *Confidence in Government Institutions*. The area of the circle is proportional to the factor's median value. Green shading indicates that the median value is positive which favors the government. Red shading indicates the median value is negative which favors the insurgency. This plot shows that the median values for these two factors are relatively high, but that the median value for *Government Corruption* is slightly lower that the median level for *Confidence in Government Institutions* in most of the conflict-affected areas.

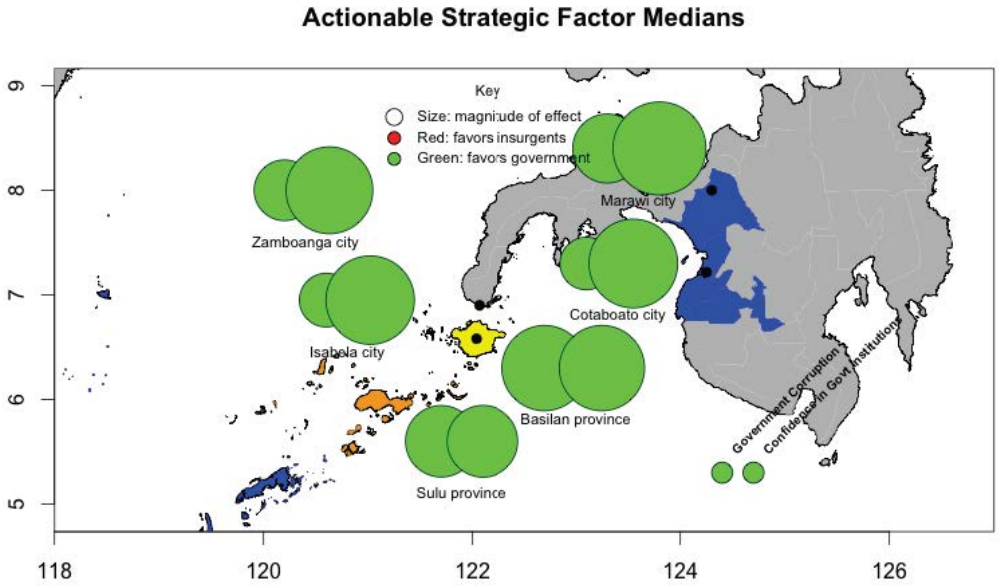


Figure 10. Plot of the median value for *Government Corruption* and *Confidence in Government Institutions* for all six conflict-affected areas. The left circle represents *Government Corruption*. The right circle represents *Confidence in Government Institutions*.

At the operational level, we evaluated the *Approval of Family Members Joining the Government* and *Approval of Family Members Joining the Insurgency* factors. These two factors fall under the doctrinal Special Operations missions of civil affairs and information operations. In their advise and assist capacity, it is within the purview of JSOTF-P to support the AFP in their counterinsurgency mission by reducing the appeal of the insurgency and improving the image of the government and armed forces within the local population. Figure 11 shows that the median values for both *Approval of Family Members Joining the Insurgency* and *Approval of Family Members Joining the Government/Military* strongly favor the government. Also, the population generally has a more strongly favorable of their family members not joining the insurgency than it does of their family members joining the GRP, AFP, or PNP. Sulu does not show a result for *Approval of Family Members Joining the Insurgency* because no factor emerged from the factor analysis. Similarly, in the factor analysis for Marawi, *Approval of Family Members Joining the Insurgency* resulted in only a single factor combining *Trust in Insurgency* with *Approval of Family Members Joining the Insurgency*. As discussed earlier, this is the factor we chose as the dependent variable in the regression modeling which will be discussed in detail in the following chapter.

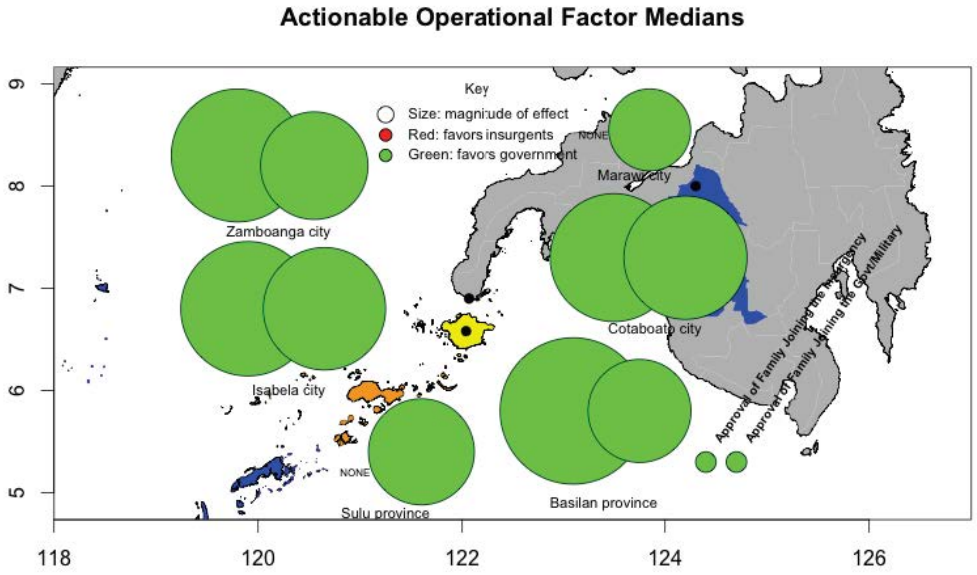


Figure 11. Plot of the median value for *Approval of Family Members Joining the Insurgency* and *Approval of Family Members Joining the Government/Military* for all six conflict-affected areas.

3.5.3. Macro Level Analysis

When we apply factor analysis at the macro level, that is to say, on the combined data set of waves II – IV (only on common questions among waves), using the exact same rules and procedures described in section 3.5, we get somewhat similar results (see Appendix E and Table 5 below), particularly to the factor structure in the conflict affected area of Zamboanga, though not an exact replication. However, while the number of factors are the same and differ in make-up by only a single factor (Zamboanga has the *Fairness of Courts* factor while the combined factors have *Awareness of Groups* in its place), the survey question composition of the factors, as well as the loadings, are different. This is not surprising, and on the contrary is to be expected, as one would hypothesize that each of the conflict affected areas would have its own unique factor structure, meaning that in each area different factors are more/less important to the population, and an "overall" / combined factor structure would be different still.

Resulting Factors Across Wave & CAA	
1	Government Corruption
2	Trust in Insurgency
3	Trust in/Performance of the Armed Forces of the Philippines
4	Threats to Peace
5	Confidence in Government Institutions
6	Trust in/Performance of the Philippine National Police
7	Satisfaction with Basic Services
8	Trust in/Performance of the CAFGU
9	Trust in/Performance of the Philippine Government
10	Approval of Family Members Joining the Insurgency
11	Awareness of Groups
12	Trust in Lesser Groups
13	Approval of Family Members Joining the Government/Military
14	Safety Provided by Lesser Groups

Table 9. Factor Analysis Results at the Macro Level.

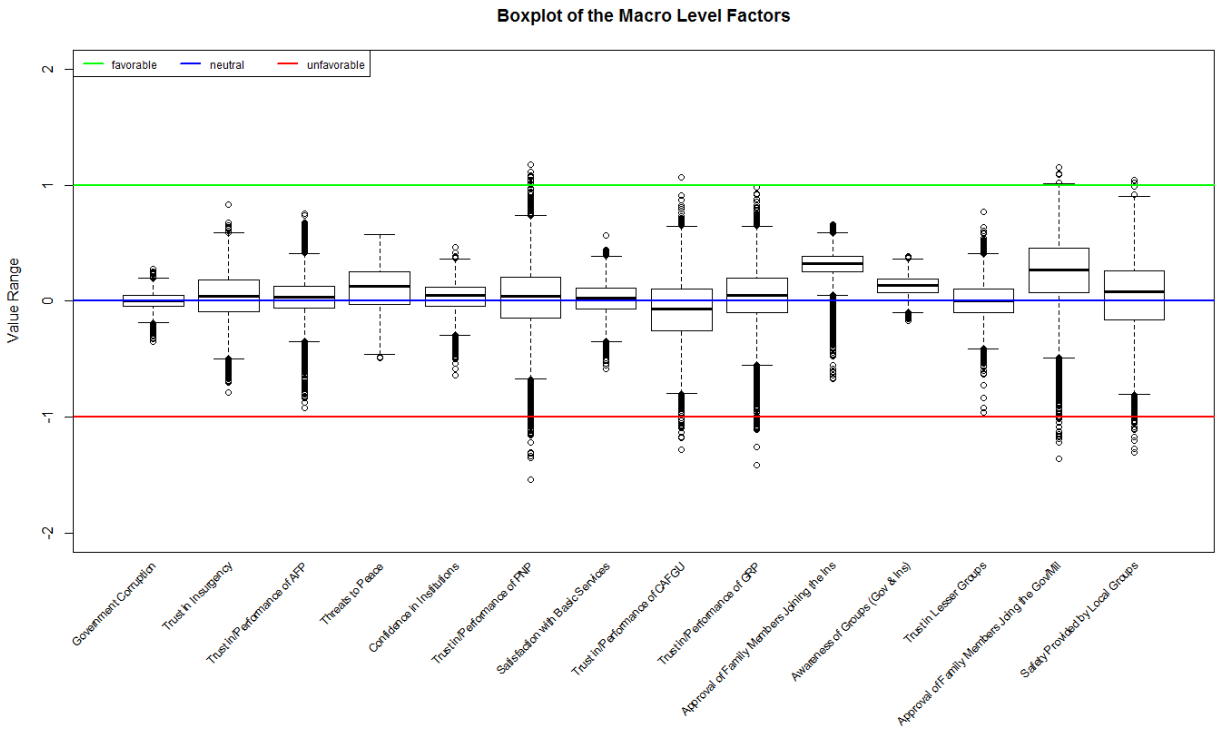


Figure 12. Boxplot of the Macro Level Factors.

Analysis of the boxplot above shows that for all but three factors, *Approval of Family Members Joining the Insurgency*, *Awareness of Groups (Government and Insurgent)*, and *Approval of Family Members Joining the Gov/Mil*, the inter-quartile range contains the "neutral", or zero factor score. Almost all of the average factor scores are not significantly different from zero, while these three factors are the most positive in the sense that their median values are the highest, and the average feeling of all of the respondents across all three waves and locations regarding approval of a family member joining the insurgency is only slightly better than neutral at 0.23.

SECTION 4. MODELING TRUST IN INSURGENCY

The selection of a dependent variable in this analysis proved more difficult than expected *a priori*. Very few of the factor results described at the end of the last chapter included a factor that specifically addressed trust in the government. In fact, only in Cotabato did *Trust in the GRP* separate from *Performance of the GRP* during the factor analysis. In all other conflict affected areas, these two factors combined together into the single factor *Trust in/Performance of the GRP* making it difficult to determine what the relationships affect which components of the factor. A strong *Trust in Insurgency* factor emerged from the factor analysis for each conflict affected area. Because of this fact, and it its applicability toward strategic and operational decision making, we decided to use *Trust in Insurgency* as the response variable for the modeling process.

The resulting factors from Section 3, excluding *Trust in Insurgency*, form the basis for the independent regression variables used in the SPPPS modeling. We did not use any individual questions as explanatory variables, but rather only factor constructs in both the micro and macro level modeling efforts.

In order to maintain as much of the original information as possible in determining the significant influences on trust in the insurgency for different segments of the population, we included the demographic indicators of Gender, Economic Class, and Religion (Wave was also used as a categorical variable in the macro level models) back into the data prior to conducting the regression analysis. This provides a possible indication of whether the different levels within each of the demographic has a different opinion toward trust in the insurgency. If the demographic term appears in the regression model, it indicates that there is a difference in opinion of how the different segments of the population view their level of trust in the insurgency. In order to detect as much difference as possible and still maintain interpretability, we consolidated each of these categorical variables to just two levels. For gender, the levels are self-explanatory. For religion, we separated the groups into Islam and non-Islam (a combination of “Roman Catholic” and “Other”), and for economic class, we separated the groups into upper, which consists of class A, B, and C, and lower class, which consists of class D1, D2, and E as defined in section 2.

The results of the factor analysis and model building are best interpreted in the context of the decision maker. Based upon the purpose and scope of the SPPPS, there are really two decision makers involved. At the strategic level, the MWG and the U.S. Embassy are responsible for advising and influencing the Philippine Government in both international relations and domestic policy, while at the operational level, JSOTF-P is responsible for aiding and assisting the AFP and PNP in reaching out to the population and presenting a competent and confident military and police force. Because of this distinction, we evaluated each model (micro level) at the strategic and operational levels and determined which factors best represented the possibility of influence by at their respective levels. First, we examined the relationship of *Trust in Insurgency* at the strategic level by comparing it with the *Government Corruption* and the *Confidence in Government Institutions* factors. We then looked at the relationship of *Trust in Insurgency* at the operational level by evaluating it against the *Approval of Family Members Joining the Government/Military* and *Approval of Family Members Joining the Insurgency* factors. At the macro level, we looked only at those factors which had the greatest influence on *Trust in Insurgency*.

4.1. MICRO LEVEL

In order to maximize the power of the model, we aggregated the Wave III and Wave IV data from each conflict-affected area and conducted factor analysis. This served to double the sample size for each area. With the two waves being collected only 3-4 months apart, and with each being treated as a simple random sample of their area based upon the sampling plan interpretation in section 2, we determined that by aggregating the data, the resulting models amplify as much of the true underlying variable structure in the data as possible while simultaneously suppressing noise that could be exhibited from wave to wave.

We decided to fit models for each conflict-affected area with up to third-degree polynomial terms and all two-factor interactions. We used the JMP 10 software package from SAS to fit a model with all first, second, and third order terms for each of the demographics and main effects and all two-factor interactions. We then used backward step-wise regression based upon Akaike's Information Criterion with a Finite Population Correction (AICc) to determine which effects and interactions should be included in the model. JMP 10 uses AICc which applies

a finite population size correction, meaning it uses the traditional AIC to reduce information loss, but also applies a penalty for including extra parameters. Using the reduced model, we then removed insignificant terms based upon p-value. This procedure had the effect of further reducing model complexity, but at the cost of a (slightly) lowered R-squared. Using JMP, we iterated through the model building process by removing the polynomial term or interaction with the highest p-value. For simplicity, we used the default type I error probability of 0.05 to determine significance. We did, however, preserve hierarchy in the models meaning that we did not remove a (potentially) insignificant lower-order term from the model if a higher-order term for the same factor was significant. Similarly, we did not remove a (potentially) insignificant main effect from the model if it appeared as part of a significant interaction. This step concluded once all of the terms in the model were significant subject to these criteria.

4.1.1. Modeling Results for Cotabato

The sample representing Cotabato is economically poor with more than 98% of the respondents coming from the lower three economic classes. Interestingly, with only 19 respondents coming from the upper three economic classes, the response differences are significant enough that the regression analysis for *Trust in the Insurgency* showed up in the final model as significant for this demographic. The difference in the mean response for the two groups is almost 0.25. On the +/- 2 scale, this is a difference of almost 6%. The Cotabato sample does have some religious diversity, however, with two-thirds of the sample reporting as Muslim and the remaining third as non-Muslim. Surprisingly the responses provided by these different groups were not significant in the final model. Additionally, the third demographic, Gender, also does not seem to have a significant difference on the population's opinions toward trust in the insurgency.

Looking at a plot of *Trust in Insurgency* as a function of *Government Corruption* and *Confidence in Government Institutions* in Figure 13 yields some interesting insights. The black line indicated the model results for measuring trust in the insurgency as a function of *Government Corruption* and *Confidence in Government Institutions* respectively with all other factors held at their median values. In addition to the median response, we also examined the extremes of both scales. The red line is the same function except the other factors are set at the

0.05 quantile and the blue line represents the other factors held constant at the 0.95 quantile. In the plot of *Trust in Insurgency* as a function *Government Corruption*, the upper extreme very closely follows the median response, albeit with a slightly negative slope, while the lower extreme seems to have the opposite opinion trend for *Trust in Insurgency*. These respondents have a more typical straightforward tendency to have a positive rating for *Trust in Insurgency* when they exhibit a positive rating for *Government Corruption*. Closer examination of the plot of *Trust in Insurgency* as a function of *Confidence in Government Institutions*, shows that at the median response level, opinion levels for *Trust in Insurgency* are independent of opinion levels for *Confidence in Government Institutions*. At the extremes, however, the slopes are similar in that the lower extreme has a slightly positive slope and the upper extreme has a negative slope. These phenomena a particularly interesting because *Confidence in Government Institutions* appears as a main effect in the model as well as in interaction terms with *Performance in the GRP, AFP, and PNP* and *Safety Provided by Lesser Groups*.

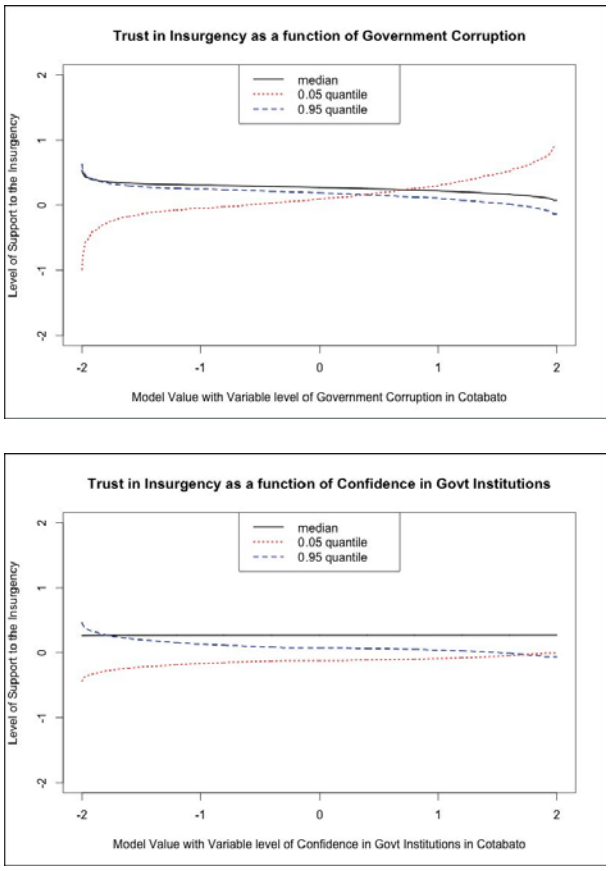


Figure 13. Trust in Insurgency as a function of strategic influence factors in Cotabato.

At the operational level, it appears that the population of Cotabato has a generally stable relationship between those who support the insurgency and those who support their family members joining the insurgency. Those who are strongly against their family members joining the insurgency (positive end of the scale) generally have a neutral opinion toward their level of *Trust in Insurgency* and those who actually support their family members joining the insurgency, have a generally favorable opinion toward their level of *Trust in Insurgency*. From an operational decision making paradigm, this is definitely an area that requires further investigation. *Approval of Family Members Joining the Government* does not appear in the final regression model. Examining the data for *Approval of Family Members Joining the Government*, however, can provide some insights into the level of support to the insurgency. The mean value for the *Approval of Family Members Joining the Government* is above 1.0 with the lower quartile being 0.7, this indicates a relatively high level of support for family members joining the military. This could indicate that only a small amount of effort is required to extend this level of positive support allowing more focus to be applied to public support for people who support their family members joining the insurgency.

4.1.2. Modeling Results for Isabela

The sample representing Isabela is again economically poor with 98% of the respondents coming from the lower three economic classes. In the Isabela model, however, the economic class of the respondents did not have an effect on their responses for *Trust in Insurgency*. As described in Section 2, Isabela is more religiously diverse than some of the other conflict-affected areas. In order to capture that difference in the survey, the sample for this area is comprised of almost exactly equal numbers of Muslim (503) and non-Mulsim (497) respondents. Even though religion emerged as a significant factor in the final regression model though, the mean response for each religious category for level of *Trust in Insurgency* is almost equal and fairly high, indicating a low level of trust in the insurgency for all residents in Isabela, not just those who identify as a certain religion. Like Cotabato, gender, did not have a significant influence on the population's opinions toward trust in the insurgency. The difficulty in Isabela comes from the interpretability of the resulting regression model for *Trust in Insurgency*. Isabela has the most complicated regression model (48 terms) among the six conflict-affected areas and more than half of the significant terms being quadratic, cubic, or two-factor interactions.

Among the strategic influences in Isabela, there is a neutral to slightly positive slope in the curves for both *Government Corruption* and *Confidence in Government Institutions* as seen in Figure 14. This indicates that both components share positive correlation with the population's rating of *Trust in Insurgency*. What is interesting in these plots is the high positive value of the responses in each category. All three respondent classifications (median, upper extreme, and lower extreme) share very high opinions of all three *Trust in Insurgency* as a function of the *Government Corruption* and *Confidence in Government Institutions* factors. Additionally, the curvature of the two plots for the bulk of the data appears to be almost linear indicating that the higher order terms could be estimated with main effects. This would dramatically simplify the model or possibly even remove either one or both *Government Corruption* or *Confidence in Government Institutions* from the regression model. This would have the additional benefit in making the model more readily explainable to a decision maker downrange.

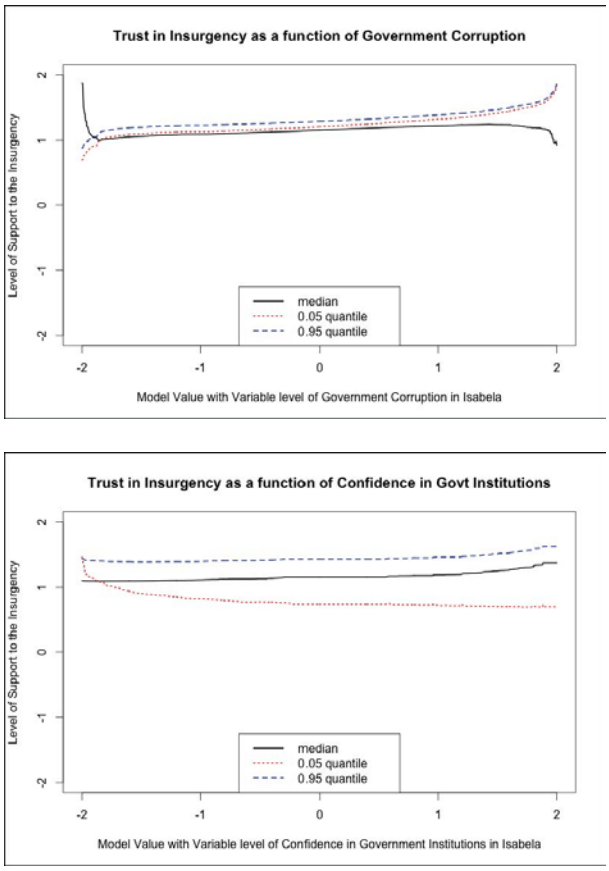


Figure 14. Trust in Insurgency as a function of strategic influence factors in Isabela.

At the operational level, the slopes of the two curves for both *Approval of Family Members Joining the Insurgency* and *Approval of Family Members Joining the Government/Military* as seen in Figure 15, are nearly horizontal indicating that potentially neither factor has an individual effect on influencing the population's trust in the insurgency. This may not be significant however, because the both factors present in several of the model's two-factor interactions. Also of note, there is a clearly higher deflection of the upper extreme respondents from the median, while the lower extreme more closely parallels the median response. This reinforces the intuitive response that those who have favorable views for both *Approval of Family Members Joining the Insurgency* and *Approval of Family Members Joining the Government/Military* tend to have favorable responses toward *Trust in Insurgency*. Additionally, there are only two negative values in the factor scores for *Trust in Insurgency* in Isabela which may explain the erratic behavior near the negative end of the plot.

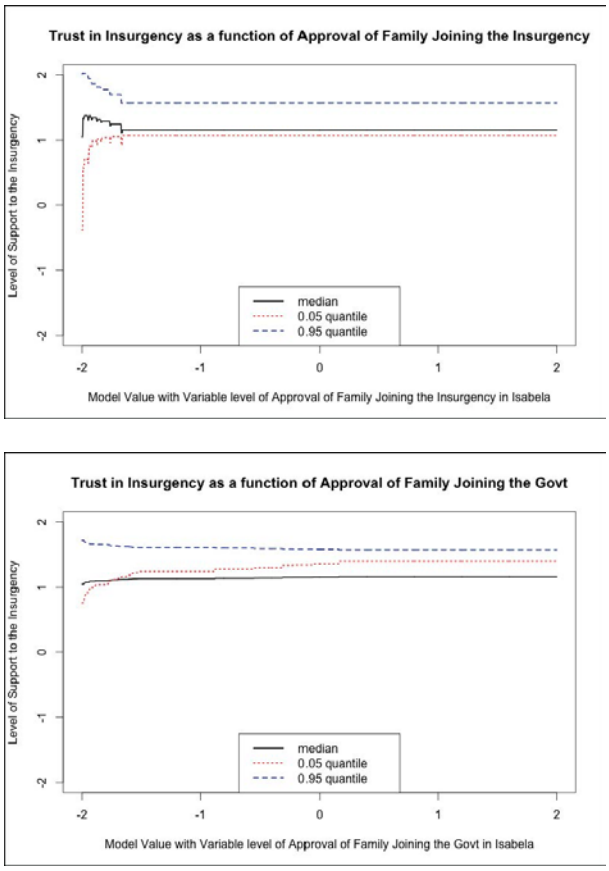


Figure 15. Trust in Insurgency as a function of operational influence factors in Isabela.

4.1.3. Modeling Results for Marawi

The Marawi sample is more than 96% Muslim and more than 97% of the respondents are from the lower economic classes. This homogeneity could be a possible explanation of why neither of these demographic indicators emerged as significant in the model. Additionally, just like the previous two models, gender does not appear as a significant factor in the model.

As previously discussed, the response variable in Marawi is *Trust in Insurgency/Approval to Family Members Joining the Insurgency*. Examining the graphs for the strategic influence factors in Marawi shows near-zero slopes for both *Government Corruption* and *Confidence in Government Institutions* as evidenced in Figure 16. This may indicate that neither factor is a significant "lever" or influence point from the population point of view, however, the fact the slopes are opposite for the two extremes for *Government Corruption* is interesting because it means that the median is not a good overall predictor for the range of responses included in this factor. In the plot of *Trust in Insurgency* as a function of *Government Corruption*, there is an obvious non-linear effect. This is most likely the result of the *Government Corruption* factor appearing in the model as a third-order term as well as interaction terms. What is interesting in these two curves is the amount of deflection that the lower extreme response has from both the median and the upper extreme. The lower extreme seems to be reasonably positive for both influence factors while the median and upper extremes show a negative value for *Trust in Insurgency*. This may indicate a higher influence from the upper extreme values on the median response. This is quite counterintuitive though, as a respondent with a favorable opinion of both *Government Corruption* and *Confidence in Government Institutions* would be expected to also have a favorable opinion toward *Trust in Insurgency*. The large number of higher-order effects present in the model could possibly be overfitting a model which is incorrectly trying to show this relationship.

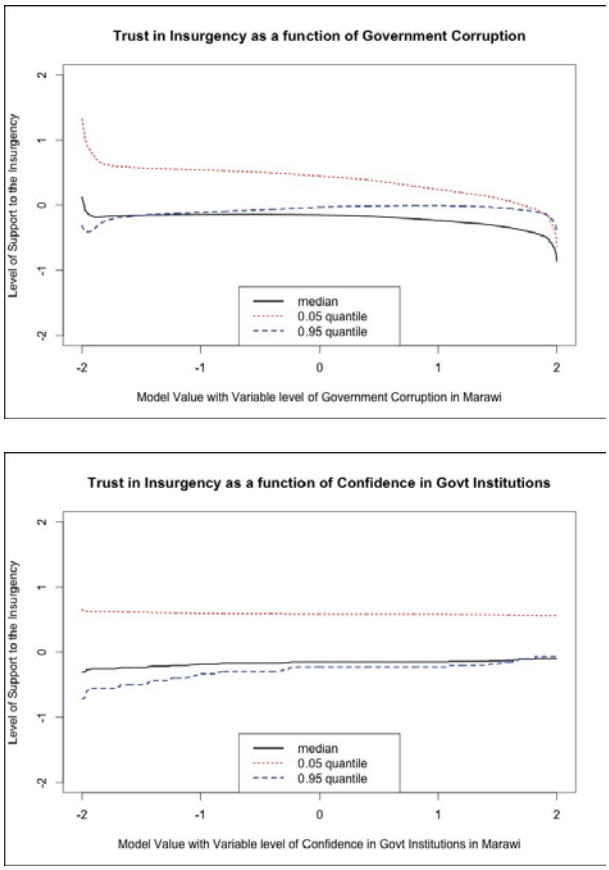


Figure 16. Trust in Insurgency / Approval of Family Members Joining the Insurgency as a function of strategic influence factors in Marawi.

At the operational level, we only looked at *Approval of Family Members Joining the Government/Military* because the other operational influence factor, *Approval of Family Members Joining the Insurgency* was included in the response variable *Trust in Insurgency/Approval of Family Members Joining the Insurgency* as a product of the factor analysis. Looking at Figure 17, the plot demonstrates the same effect as in Figure 16. The slope is also near zero indicating that it may also be a poor indicator of the population's opinion of trust in insurgent groups, but also that the lower extreme has a much larger deflection from the median response. There is also some erratic behavior that could potentially be the effect of this variable only taking on 13 unique values. The jumps in the curve appear to occur when the value for *Approval of Family Members Joining the Government/Military* changes.

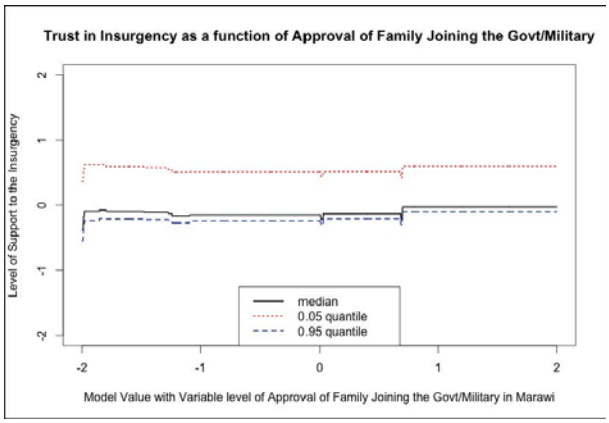


Figure 17. Trust in Insurgency / Approval of Family Members Joining the Insurgency as a function of operational influence factors in Marawi.

4.1.4. Modeling Results for Southern Basilan

The sample representing Southern Basilan is again economically poor with 98% of the respondents coming from the lower three economic classes. It is also fairly homogenous with more than 81% of the sample respondents identifying as Muslim, but not nearly as homogeneous as most of the other conflict-affected areas. Despite this difference, none of the demographic characteristics of the area had a significant enough response difference to appear as a term in the final regression model.

The strategic factors in Southern Basilan continue to corroborate the ideas from the previous section that the overall opinion of the population is favorable for *Trust in Insurgency*. Additionally, based on the overall shape of the curves in Figure 18, both *Government Corruption* and *Confidence in Government Institutions* are subject to influence for strengthening this relationship. This means that there is evident a positive correlation between the levels of popular opinion toward *Government Corruption* and *Confidence in Government Institutions* and the level of popular opinion of *Trust in Insurgency*.

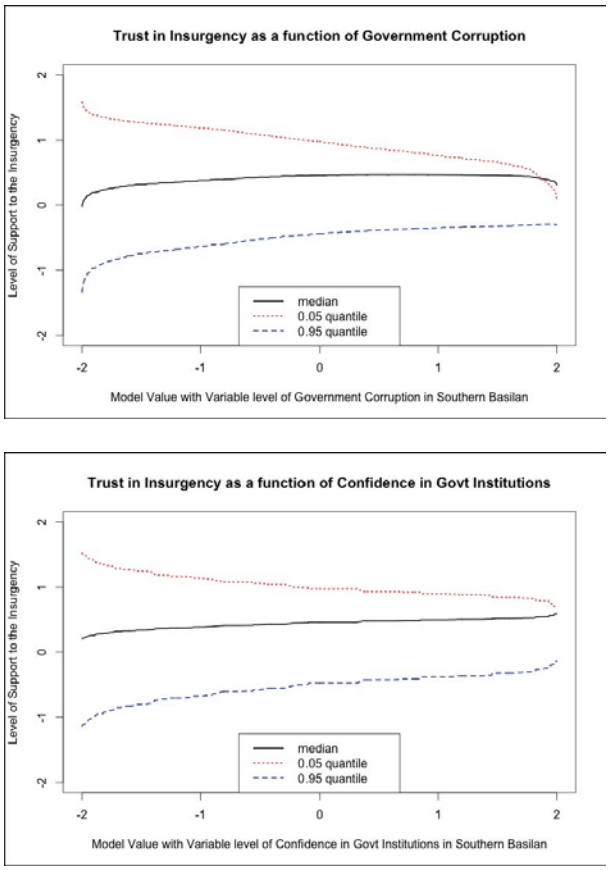


Figure 18. Trust in Insurgency as a function of strategic influence factors in Southern Basilan.

At the operational level, there is not much indication that either *Approval of Family Members Joining the Insurgency* or *Approval of Family Members Joining the Government/Military* has influence on the population's support toward *Trust in Insurgency*. As seen in Figure 19 the slopes are extremely close to zero indicating that a change in either will potentially not cause a change in the population's opinion toward *Trust in Insurgency*. Additionally, there is more erratic behavior toward the negative end of the response scale for Approval of Family Members Joining the Insurgency. This may be a result of large jumps in the factor scores. Only 20 of the 1000 scores are negative and of the twenty scores, there are only three unique values. This is most likely the cause of this "jump" effect.

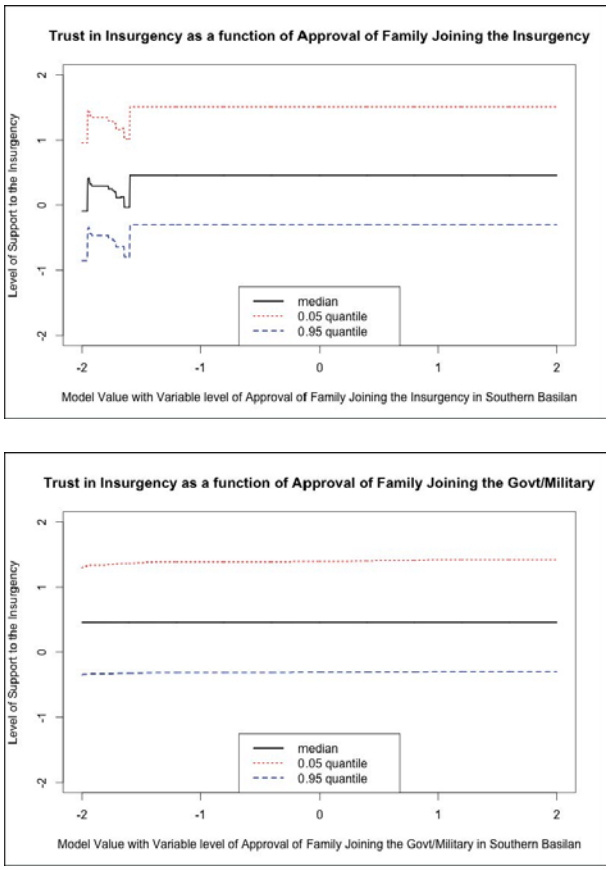


Figure 19. Trust in Insurgency as a function of operational influence factors in Southern Basilan.

4.1.5. Modeling Results for Sulu

The sample representing Sulu is also economically poor with 97% of the respondents coming from the lower three economic classes. It is also religiously homogenous with more than 98% of the sample respondents identifying as Muslim. Once again, this homogeneity is a strong indication of why none of the demographic differences have a significant difference in opinion to appear as a distinction in the resulting regression model.

The results for measuring *Trust in Insurgency* as a function of *Government Corruption* and *Confidence in Government Institutions* in Sulu are shown in Figure 20. *Government Corruption* has a slightly positive slope for both the median and upper extreme respondents and a mostly neutral slope for the lower extreme respondents. This may indicate that public opinion toward corruption is a good indicator of public opinion toward trust in the insurgency. While a causal relationship cannot be concluded from this model, it is reasonable to assume that as the perceived level of corruption in the government goes down, the support for the insurgency will

also decrease. Unfortunately, the slope of the curve for *Confidence in Government Institutions* is near zero for all three respondent categories despite the fact that the factor appears as a third order term in the model. This slope indicates that public opinion toward *Trust in Insurgency* is more than likely independent of the level of *Confidence in Government Institutions*.

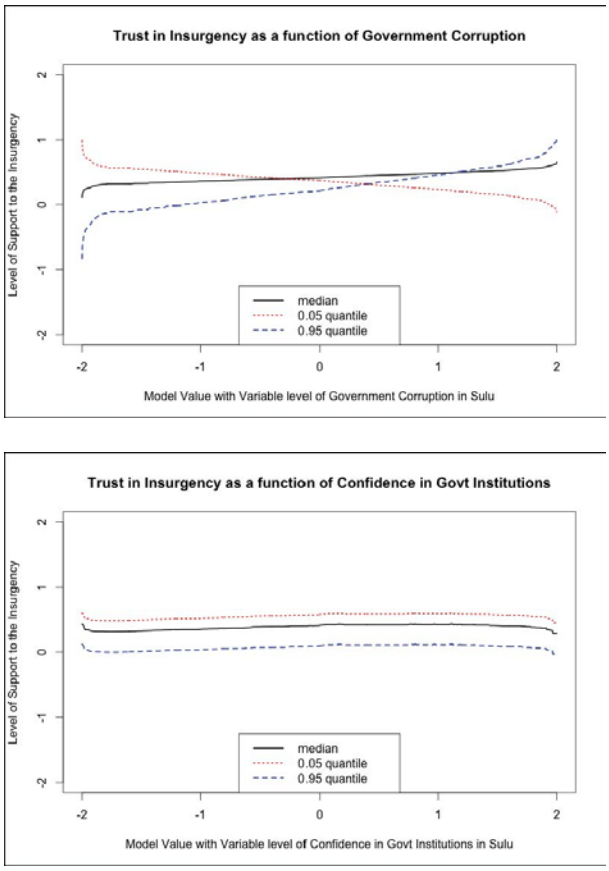


Figure 20. Trust in Insurgency as a function of strategic influence factors in Sulu.

As discussed in the previous chapter, *Approval of Family Members Joining the Insurgency* factor did not emerge from the factor analysis in Sulu. *Trust in Insurgency*, however, does not appear to share any significant correlation *Approval of Family Members Joining the Government* even though it appears in the final model as a significant main effect and as part of a two-factor interaction. The near-zero slope of the curve in Figure 21 indicates that any change, either favorable or unfavorable, in public support for their family members joining the GRP, AFP, or PNP does not share a relationship one way or the other with level of trust in the insurgent organization in Sulu. This is unfortunate considering the fact that this Sulu is currently JSOTF-Ps main effort as discussed previously.

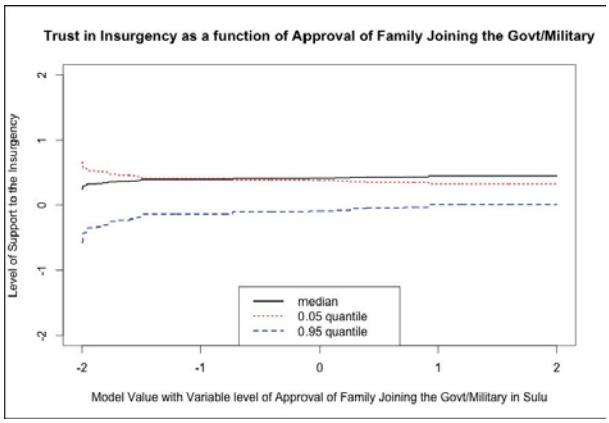


Figure 21. Trust in Insurgency as a function of operational influence factors in Sulu.

4.1.6. Modeling Results for Zamboanga

The sample representing Zamboanga is also economically poor with 93% of the respondents coming from the lower three economic classes, but it is unique among the six conflict-affected areas in that it is more than 72% non-Muslim. Despite this obvious difference in the sample characteristics, again none of the demographic terms appear in the final regression model for this area. The regression model for Zamboanga is unique, however, in the terms that emerged as significant. The model is made up of mostly main effects and two-factor interactions. Only one factor *Approval of Family Members Joining the Insurgency* emerged individually as a higher order term in the final model.

Figure 22 shows the relationship of the *Trust in Insurgency* factor as a function of *Government Corruption* and *Confidence in Government Institutions*. The slopes of the curve indicate neutral to positive relationships with both factors. The slope associated with *Confidence in Government Institutions*, however, is the most positive association of any of the six conflict-affected areas for that factor.

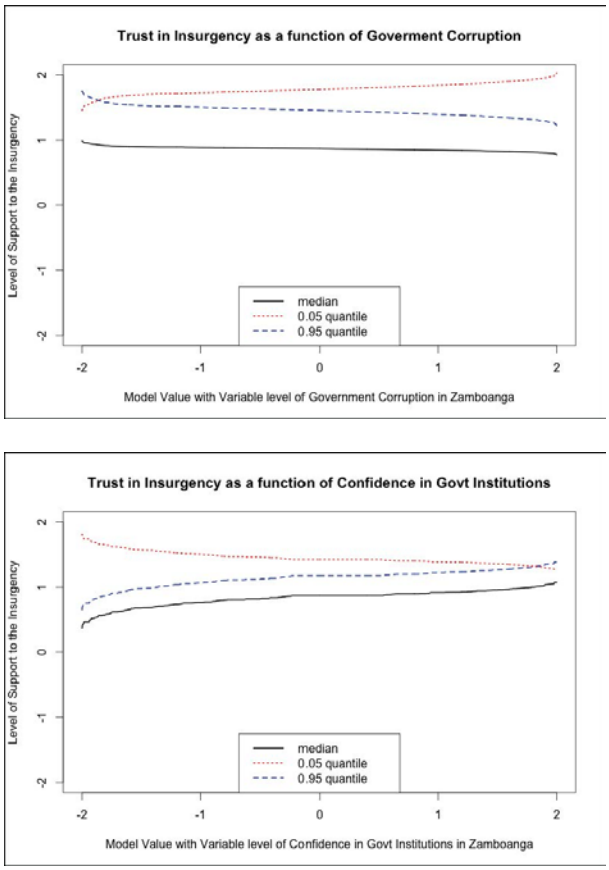


Figure 22. Trust in Insurgency as a function of strategic influence factors in Zamboanga.

At the operational level, the relationships are even more insignificant for *Trust in Insurgency* as a function of *both Approval of Family Members Joining the Insurgency* and *Approval of Family Members Joining the Government*, as seen in Figure 23. There is very little, if any, indication of a positive or negative slop in the curves indicating that the level of support for either factor is not a good predictor for *Trust in Insurgency*. This is not to say that they are not significant in the presence of the other factors and interactions in the model, only that considered independently with all other factors being held constant, they do not appear to offer an explanation either way. One takeaway from these plots, however, is that the level of *Trust in Insurgency* is generally favorable when plotted against these factors and the amount of deflection between the median response and the two extreme responses generally trends together. Additionally, the erratic behavior in the *Approval of Family Members Joining the Insurgency* may be explained by the fact that there are only eight negative scores for that factor.

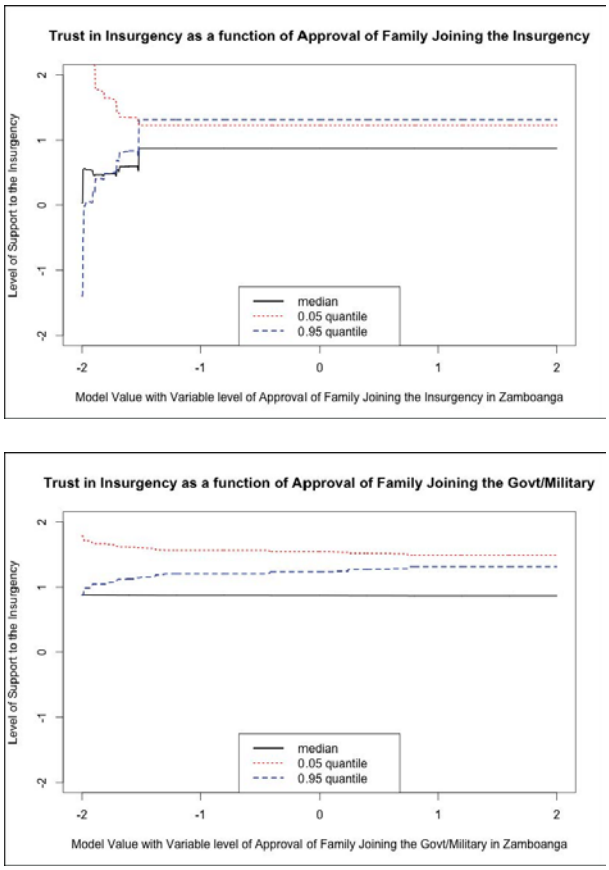


Figure 23. Trust in Insurgency as a function of operational influence factors in Zamboanga.

4.1.7. Micro Level Summary

In order to consolidate the information from each conflict-affected area, we used the color-coded circle plot shown in Figures 24 and 25 to display the strategic and operational modeling results. In the context of the fitted regression models, the size and color of the circle represents the magnitude of the effect and whether the relationship between *Trust in Insurgency* and the specific influence factor favors the government or the insurgency. A government-favoring relationship is defined by an improvement in a given factor causing a subsequent improvement in *Trust in Insurgency*. Conversely, an insurgency-favoring relationship is defined by an improvement in a given factor resulting in a decline in *Trust in Insurgency*.

In a main effects model, the circles would represent the magnitude and sign of the regression coefficient of the fitted model. Because the selected strategic and operational influence factors appear in every model as higher order terms or as part of interaction terms, we used the fitted models to calculate the difference in *Trust in Insurgency* at two levels, slightly

above and slightly below the median value. We then used the change in *Trust in Insurgency* and the change in the specific influence factor to measure the slope or relationship between the two factors. Positive slopes indicate a favorable change in the level of *Trust in Insurgency* and negative slopes indicate an unfavorable change. In the plot, the size the circle represents the magnitude of the effect and the color represents whether it is favors the government or the insurgency. Green shading indicates a relationship which favors the government, and red shading indicates a relationship which favors the insurgency.

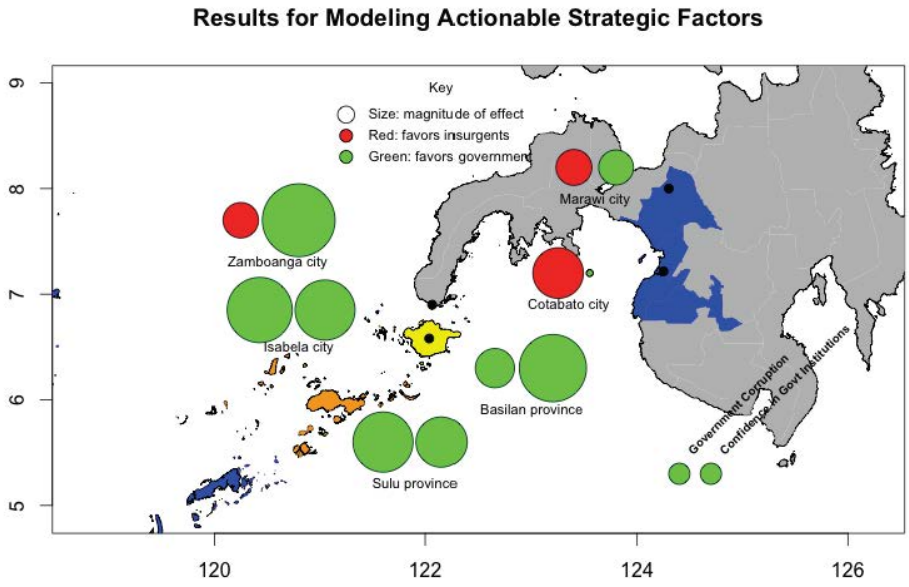


Figure 24. Plot of the effect for Government Corruption and Confidence in Government Institutions for all six conflict affected areas.

For the strategic influence factors, Cotabato, Marawi, and Zamboanga all show an insurgency favoring relationship with *Government Corruption*. This could indicate that the level of corruption in these areas bears investigation and that there may be an opportunity for strategic influence by the national government advised by the MWG and the U.S. Embassy. All six conflict affected areas demonstrate a government favoring relationship for *Confidence in Government Institutions*.

At the operational level, it is clear from these plots that most of the conflict affected areas measured by the SPPPS have a government-favoring relationship with *Approval of Family*

Members Joining the Insurgency. Only Isabela has a negative slope associated with this factor indicating an effect which favors the insurgency. This relationship, however, may not be correct. While there is evidence of a negative correlation between these two factors, the calculated correlation is almost zero. This negative slope relationship is may be due to multicolinearity in the fitted model and not a true insurgency-favoring relationship within the population.

The effects associated with *Approval of Family Members Joining the Government/Military* are slightly different. Marawi, Southern Basilan, and Zamboanga all exhibit a slightly insurgency favoring relationship for this factor and Cotabato exhibits a neutral relationship. It is clear from the plot, however, that the magnitude of the effects from this factor are, in general, much smaller that the effect for *Approval of Family Members Joining the Insurgency*, indicating that *Approval of Family Members Joining the Government/Military* does not have much power in estimating a population's level of *Trust in Insurgency*.

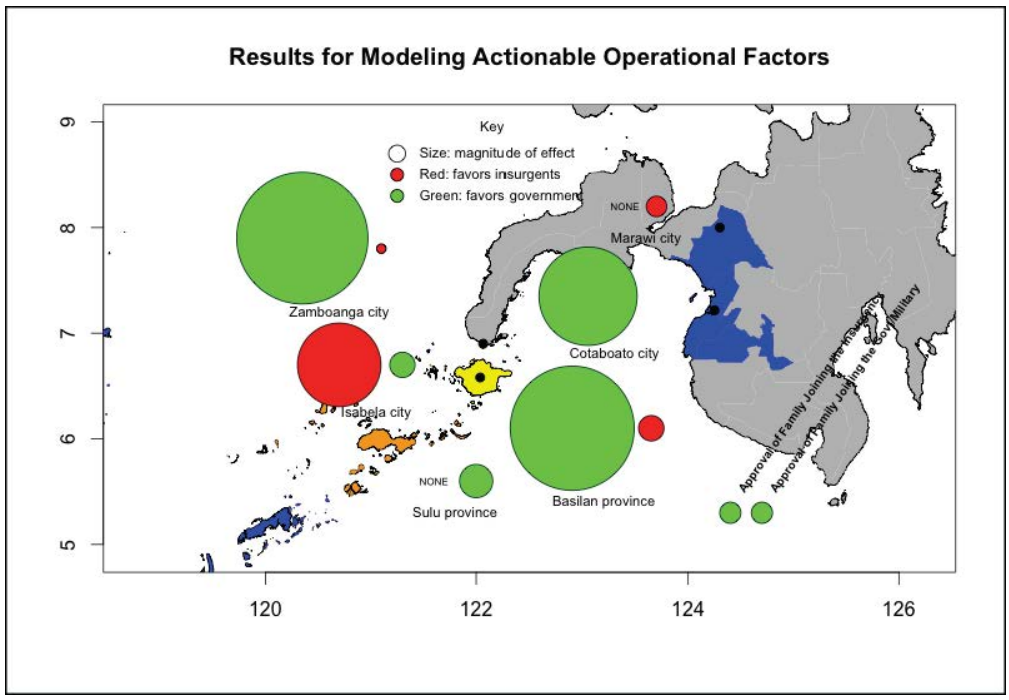


Figure 25. Plot of the effect for Approval of Family Members Joining the Insurgency and Approval of Family Members Joining the Government/Military for all six conflict affected areas.

4.2. MACRO LEVEL

For the macro level analysis, that is, the analysis that combined waves 2-4 into a single data set and then imposed a single factor structure across location and time, we present the

modeling results in a slightly different manner. The graphs presented below in Figure 26 are called Influence Plots, and show, for each of the conflict affected areas, the relationship between each significant factor and *Trust in Insurgency*. These plots tell us which factors have the most "leverage" when it comes to influencing a respondent's trust in the insurgency. The significant factors are shown on the x-axis (each CAA has a different number because a different number of factors show up as significant in each of the models), and the strength and direction of relationship is shown on the y-axis. The strength of relationship, or the magnitude of the bar, is really the slope, or value of coefficient(s) in the model, and whether this value is positive or negative determines if the bar is above (green) or below (red) the zero line.

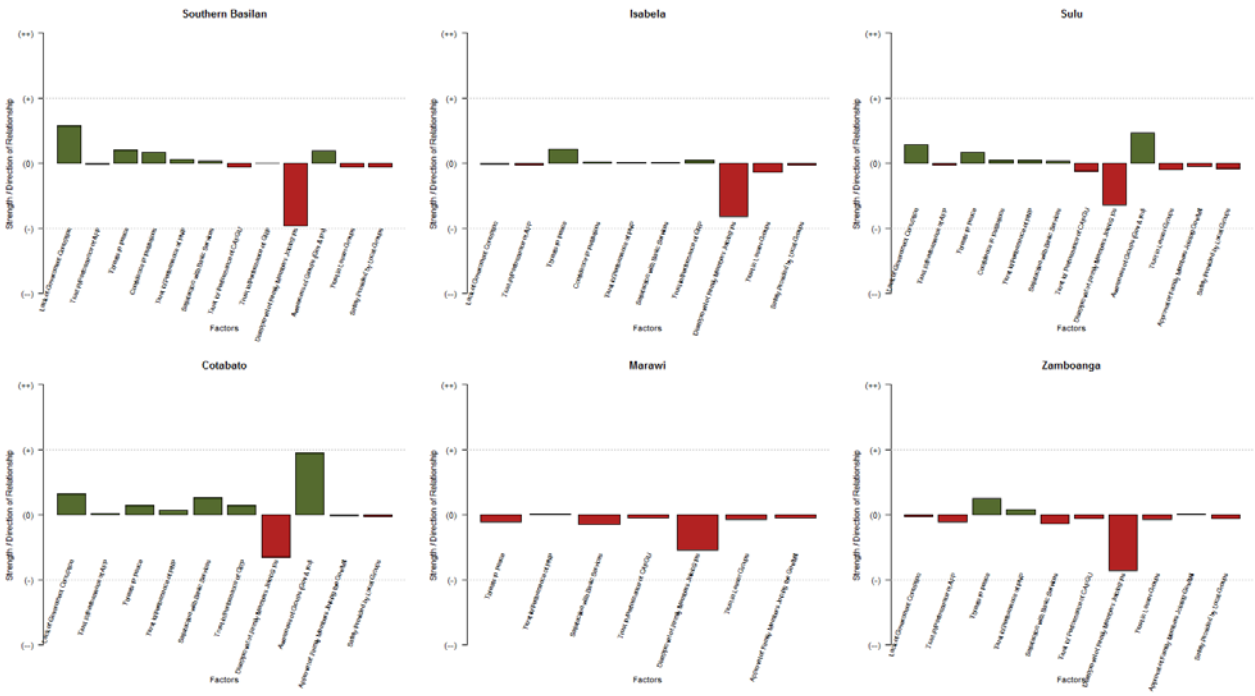


Figure 26. Influence Plots for all six conflict affected areas.

We see some interesting results in Figure 26. In each of the six conflict affected areas (except Cotabato, where it is the second largest) we see *Approval of Family Members Joining the Insurgency* as the single factor that has the largest influence over *Trust in Insurgency*. The troubling aspect of this result is that the relationship is negative, meaning that as a respondents approval level of one of their family members joining the insurgency decreases, their trust in the insurgency increases, which intuitively makes no sense, and is contrary to the findings in the micro level analysis. While this requires some additional investigation, our initial thought is that

this is an instance of Simpson's Paradox, in which the aggregation of the data into a single data set of 9000 respondents has in effect reversed the results of the micro level analysis.

Other factors that have a strong influence over *Trust in Insurgents* at the macro level include *Awareness of Groups* and *Government Corruption*, both in positive direction, which can be interpreted as an increase in the awareness of certain groups or an increase in government corruption will lead to an increase in the trust of the insurgency.

SECTION 5. KEY DRIVER ANALYSIS AND CONCLUSIONS

The objective of this research was to determine what are the significant factors affecting the population's level of trust in the insurgency. This chapter brings together the factor analysis results from Section 3 and the fitted models from Section 4 for each of the six conflict-affected areas (micro level) and the combined locations (macro level) into some simple graphical decision aids in an attempt to answer this question. It also highlights our conclusions from this research and analysis, and finishes with recommendations for further research.

5.1. KEY DRIVER ANALYSIS

Key Driver analysis is the process of evaluating each factor's effect on *Trust in Insurgency* and determining which factor or factors have the strongest relationships with that level of trust. Using the factor scores from Section 3 and the fitted models from Section 4, we evaluated each of the independent variable factors individually in order to determine their relationship with *Trust in Insurgency*. Using the methodology discussed at the end of the previous section, we plotted the effects for each factor against the factor median value in a Key Driver plot. The interpretation of these plots is shown in Figure 27. Quadrant I captures those factors that have a positive median value and a positive regression coefficient. This indicates a favorable opinion of that factor and a positive or government-favoring relationship with *Trust in Insurgency*. Conversely, quadrant III captures those factors that have an unfavorable median value and an insurgency-favoring relationship with *Trust in Insurgency*. Quadrants II and IV are more difficult to explain, as these quadrants capture mixed relationships. In these quadrants, the sign of the median response for that factor has the opposite relationship with *Trust in Government*. Ideally, if a factor falls in one of these two quadrants, the magnitude of the coefficient is small indicating that it is not a key driver for *Trust in Insurgency*.

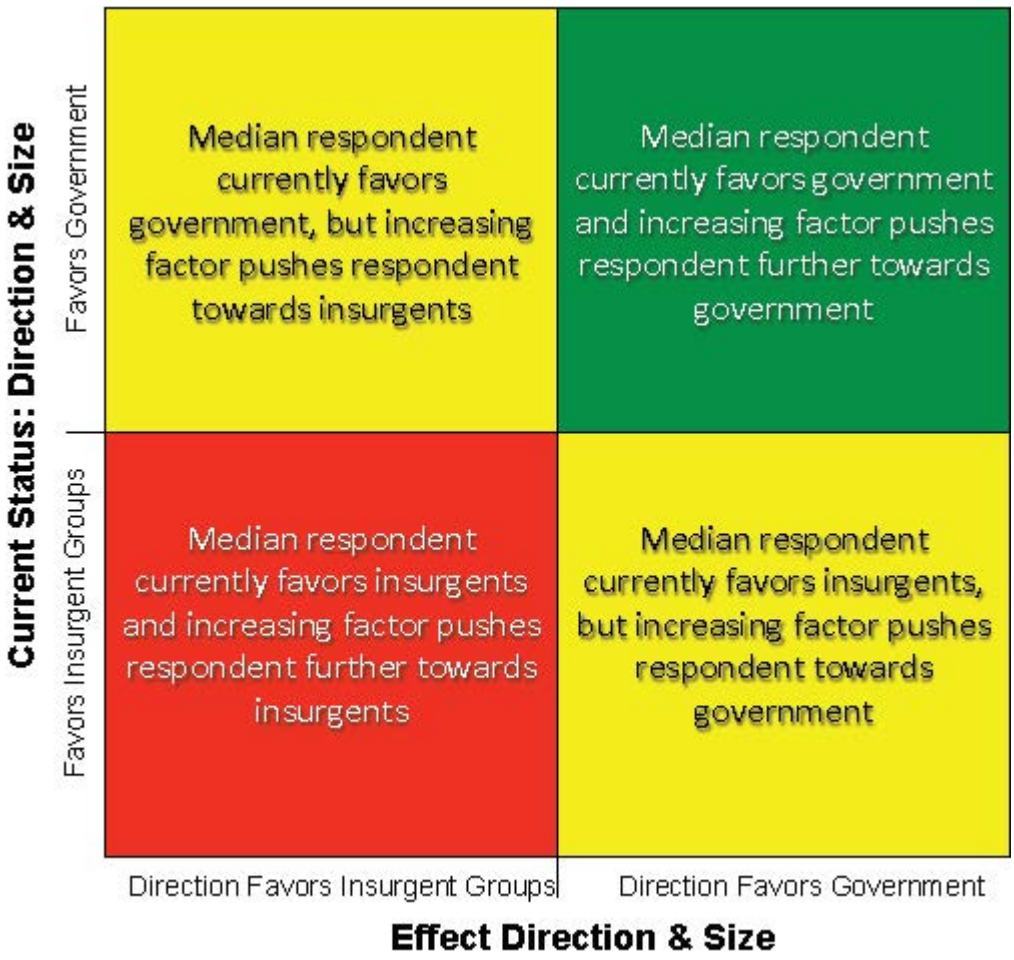


Figure 27. Explanation of Key Driver Plot.

5.1.1. Cotabato Key Driver Analysis

Figure 28 clearly shows that *Approval of Family Members Joining the Insurgency* is the key driver for estimating the Cotabato population's level of *Trust in Insurgency*. Intuitively, this conclusion makes sense. If a population has a low level of trust in insurgent groups, they generally do not favor of their family member joining the insurgency. In contrast, the local population in Cotabato has a very favorable opinion of *Approval of Family Members Joining the Government/Military*, but this factor does not have a strong influence in estimating the level of Trust in Insurgency.

At the strategic level, *Government Corruption* has a slightly positive median value, but appears to exhibit an insurgency-favoring relationship with *Trust in Insurgency*, namely a more

favorable opinion of *Government Corruption* pushes the level of public opinion toward *Trust in Insurgency* in a less favorable direction. This relationship is counterintuitive and may be an artifact of the factor analysis. In either case, the effect of *Government Corruption* is small when compared to *Trust in Insurgency* and it is therefore not considered to be a key driver for *Trust in Insurgency* in Cotabato. The effect of *Confidence in Government Institutions* is extremely close to zero and therefore it is also not considered to be a key driver in Cotabato.

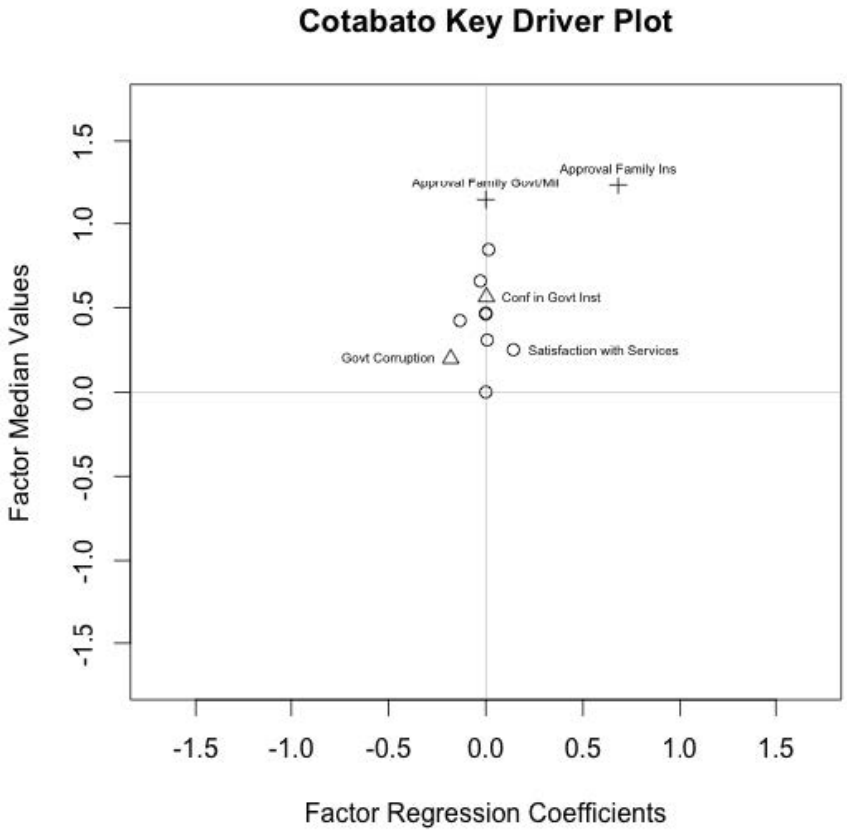


Figure 28. Key Driver Plot for Cotabato.

5.1.2. Isabela Key Driver Analysis

In Isabela, the key drivers are not as clear. Figure 29 shows that strongest positive indicator in Isabela is *Overall Awareness*. This is one of the Unique Factors in Isabela and its construct really provides no insight as to its relationship with *Trust in Insurgency*. Similarly,

Approval of Family Members Joining the Insurgency has the highest median value of all of the factors, but as discussed in the previous chapter, it exhibits a negative effect on *Trust in Insurgency*. *Government Corruption* and *Confidence in Government Institutions* both have positive median values and government-favoring relationships with *Trust in Insurgency*. *Approval of Family Members Joining the Government* has a strong positive median value, but only has a small favorable relationship with *Trust in Insurgency*.

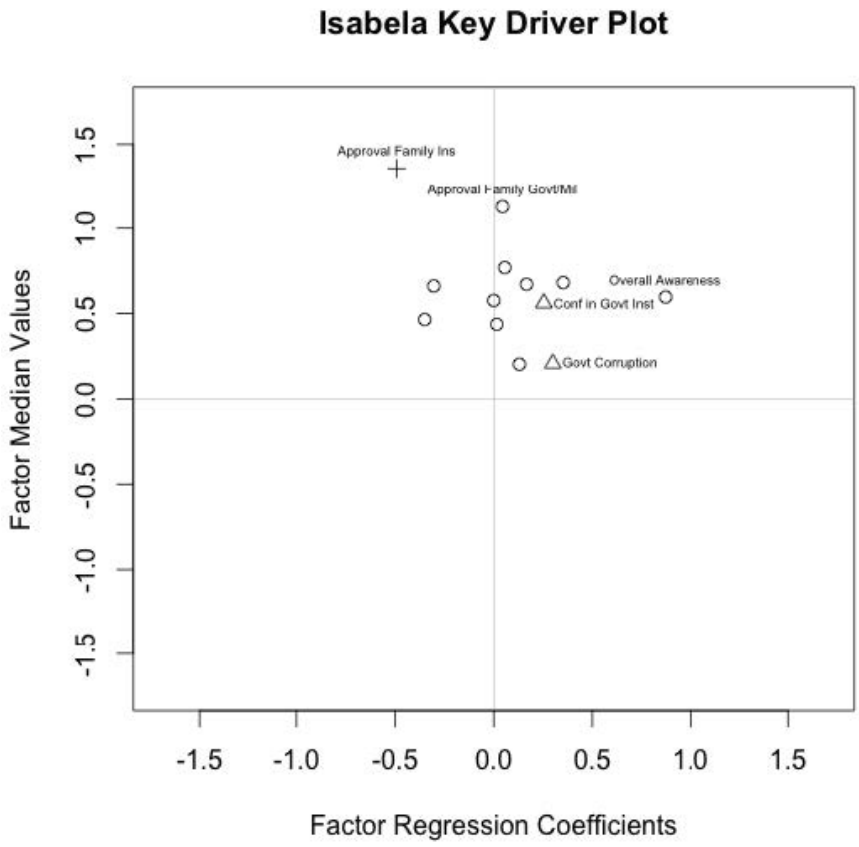


Figure 29. Key Driver Plot for Isabela.

5.1.3. Marawi Key Driver Analysis

As shown in Figure 30, all of the factor coefficients are relatively small indicating there are no evident key drivers for *Trust in Insurgency* in Marawi. Similarly to Isabela, the largest regression coefficient for Marawi is *Overall Awareness*. Because of the construct of this factor, it

does not offer much explanatory power for estimating the population's opinion toward *Trust in Insurgency*. As was discussed in Sections 3 and 4, Marawi demonstrates unique characteristics in both the factor analysis and modeling results. This may be a representation of its population characteristics, or simply that no element of the SPPPS survey instrument accurately measures the opinion of the population's support to insurgent organizations. In either case, the population has relatively favorable opinions for all of the factors with the exception of *Trust in/Performance of the CAFGU*. For the strategic and operational influence factors, *Government Corruption* has a slightly insurgent-favoring model coefficient, while *Confidence in Government Institutions* shows an equally small government-favoring relationship. At the operational level, *Approval of Family Members Joining the Government/Military* has a small positive median value and a small government-favoring relationship. Despite these relationships, none of the factors has a regression coefficient large enough to be considered a key driver for *Trust in Insurgency*.

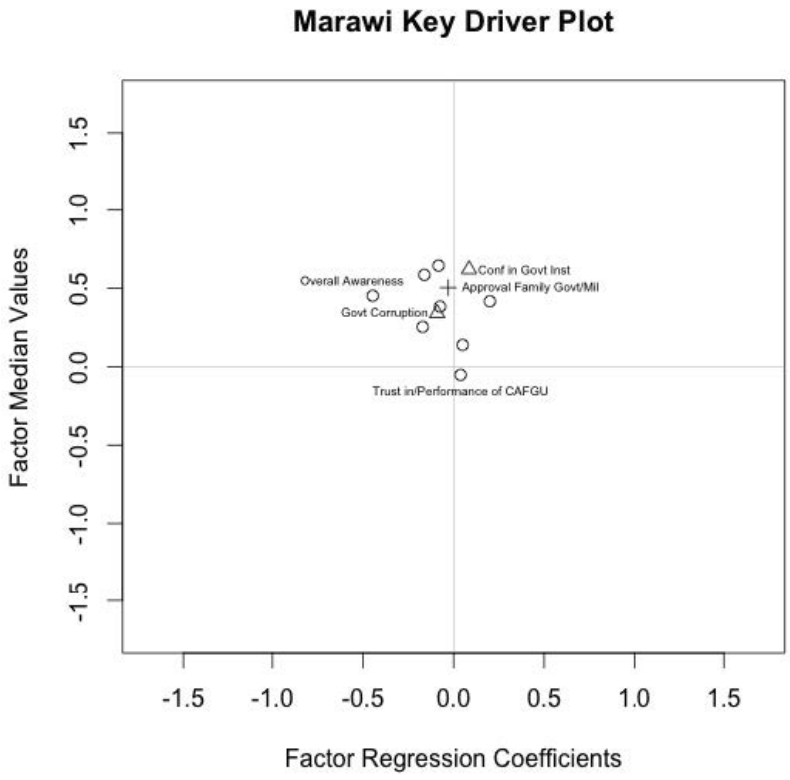


Figure 30. Key Driver Plot for Marawi.

5.1.4. Southern Basilan Key Driver Analysis

Similar to Cotabato, Figure 31 shows that *Approval of Family Members Joining the Insurgency* is the key driver for *Trust in Insurgency*. A strongly positive median value coupled with the largest regression coefficient show that more than any other factor, *Approval of Family Members Joining the Insurgency* is the best estimator for the population's level of *Trust in Insurgency*. The two strategic influence factors, *Government Corruption* and *Confidence in Government Institutions* both have positive median values and weak government-favoring relationships with *Trust in Insurgency*. The remaining operational influence factor, *Approval of Family Members Joining the Government/Military* has a positive median value, but an almost zero regression coefficient. *Fairness of the Courts* has a strong insurgency-favoring effect, but because of the magnitude of the coefficient, it is not a key driver for estimating *Trust in Insurgency* in Southern Basilan.

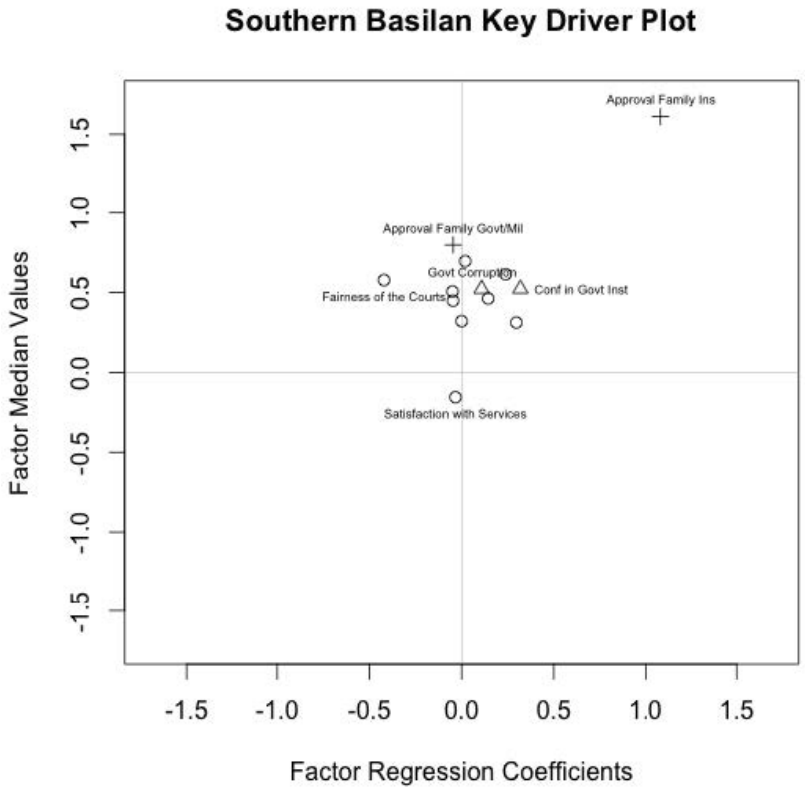


Figure 31. Key Driver Plot for Southern Basilan.

5.1.5. Sulu Key Driver Analysis

The Key Driver plot for Sulu, shown in Figure 32, has similar characteristics to the Key Driver plot for Marawi. Because of the relatively small magnitude of the factor coefficients, none of the factors are strong indicators one way or the other for *Trust in Insurgency*. *Government Corruption* and *Confidence in Government Institutions* both have positive median values, but very small government-favoring regression coefficients. *Approval of Family Members Joining the Government* has the highest median value, but only a small government-favoring regression coefficient. Only one factor, *Trust in/Performance of the AFP*, had a decently negative regression coefficient in Sulu, but because of its relatively small coefficient, I didn't consider any of them as key drivers for *Trust in Insurgency*.

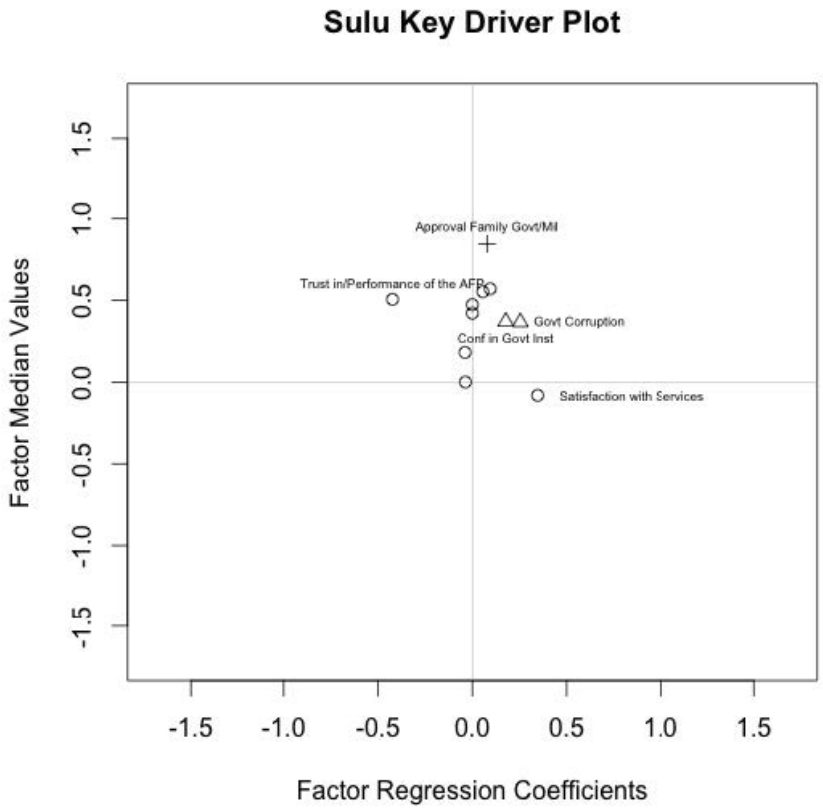


Figure 32. Key Driver Plot for Sulu.

5.1.6. Zamboanga Key Driver Analysis

The Key Driver plot for Zamboanga is ideally what each of six areas should look like. There is one clear key driving factor for estimating *Trust in Insurgency* with the rest of the factors contributing little or no effect. Figure 33 is strongly related to the Key Driver plots in Cotabato and Southern Basilan in that once again *Approval of Family Members Joining the Insurgency* is the dominant factor in estimating the population's level of *Trust in Insurgency*. All of the other factors reside very close to the axis indicating that they have only marginal influence in estimating Trust in Insurgency.

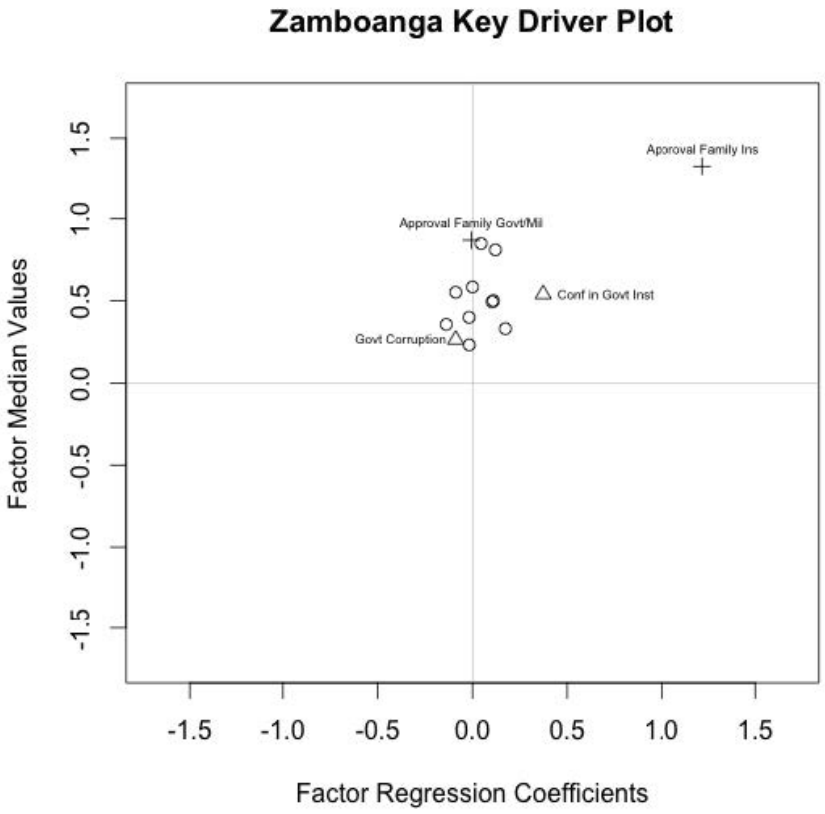


Figure 33. Key Driver Plot for Zamboanga.

5.1.7. Micro Level Summary

In three of the six conflict-affected areas, *Approval of Family Members Joining the Insurgency* emerged as the key driver in estimating the local population's level of *Trust in Insurgency*. This intuitive relationship definitely falls within the scope of the MWG and JSOTF-

P and may offer new insights to the task force on how to focus efforts to continue to improve the public's favorable opinions for this factor. Similarly, in four of the models, both *Government Corruption* and *Confidence in Government Institutions* emerged with government-favoring relationships indicating that as the public's opinion toward these factors improves, it is highly likely that the level of Trust in Insurgency will also become more favorable. The median value for *Approval of Family Members Joining the Government/Military* across all six conflict-affected areas remains relatively positive, but this factor does not appear to share a strong relationship with *Trust in Insurgency*.

5.1.8. Macro Level Key Driver Analysis

At the macro level, *Approval of Family Members Joining the Insurgency* emerged as the key driver in estimating a respondent's level of trust in the insurgency in five out of the six CAAs as we can see in Figure 34. Only in Cotabato was this not the case, where *Awareness of Groups* was the key driver. Also of note, *Government Corruption* showed up in the majority of the conflict affected areas as a secondary key driver of Trust in Insurgency.

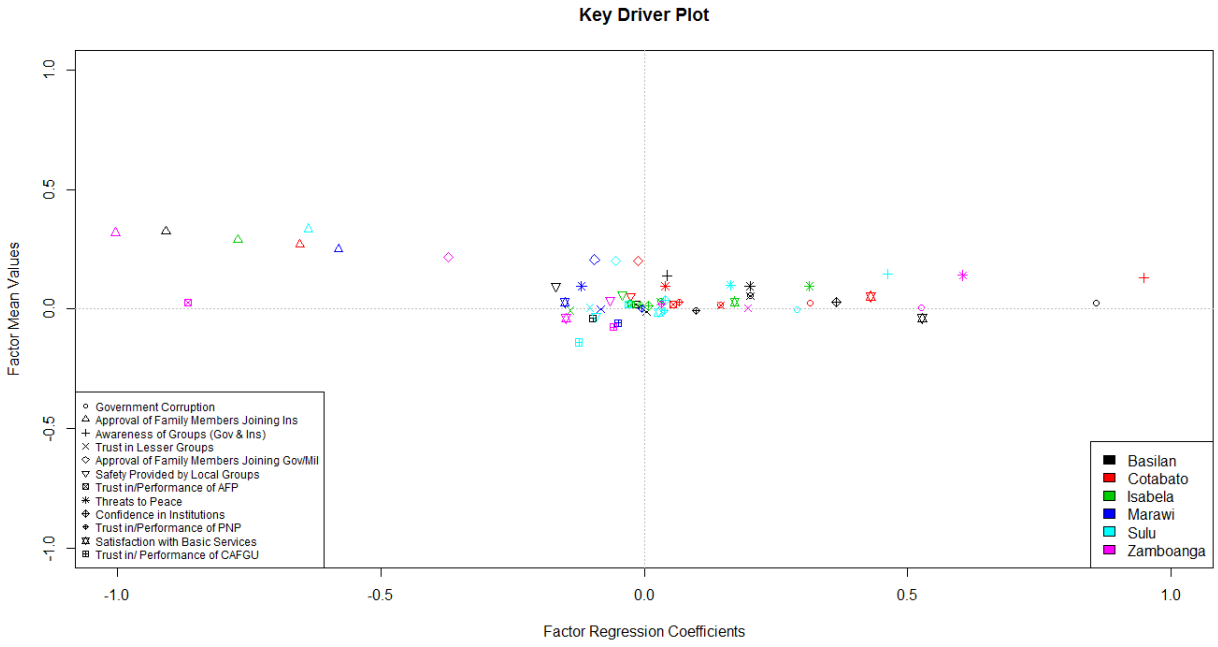


Figure 34. Key Driver Plot for Macro Level Analysis.

5.2. CONCLUSIONS

It is clear from the SPPPS data, the factor analysis, and the resulting models that each conflict affected area has its own unique social, economic, and religious identity. The U.S. Government, particularly the U.S. Embassy and JSOTF-P, has invested more than 10 years in supporting and assisting the Philippine Government and its armed forces in combatting the influence and spread of VEOs that have antagonized the country for almost a half-century. Even as the country moves forward with reconciliation with groups formerly identified as threats such as the MILF an MNLF, there appears to be strong evidence that the population still associates these groups with the insurgency and as a threat to the peace and stability of their barangays and neighborhoods. This section presents conclusions and identifies opportunities for further research.

5.2.1. Survey Instrument Recommendations

Several recommendations have already been conveyed to the Center for Army Analysis concerning survey instrument changes, survey fielding, and data collection procedures (see Appendices G and H). We will highlight two recommendations which we believe will have the maximum effect on the data.

- Survey Length – If response data is going to be consolidated into a factor analysis, the influence of an individual question diminishes as the number of questions relating to that factor increases. For example, in all six models, at least 18 of the 19 questions concerning the trust and ability of the AFP to perform its mission grouped together as a factor. Considering the same results for the GRP and PNP, almost one third of the survey grouped together into reasonable factors. With the factors being rescaled in order get a direct comparison in magnitude of the resulting regression coefficient, more questions grouping together does not necessarily change its influence in the resulting model. As a result of this, we recommended reducing the number of questions in these areas and including additional questions concerning benevolence and the population's propensity to trust these organizations and institutions. This effect would be two-fold in that it would (hopefully) force the underlying factor structure to more closely mirror the

components of theoretical trust mdoels which would in turn lend credence to causal relationships among the regressors with the *Trust in Insurgency* response variable.

- Survey Periodicity – As of April 2013, the four waves of the SPPPS have been completed, the fifth wave currently being collected in the field, and a sixth wave has been funded for future work. Based upon my detailed analysis of Waves III and IV, we recommended that the periodicity of the survey be extended past the current 90 days.

5.2.2. Future Research / Analysis

There are several opportunities for further analysis of this data and future waves of the SPPPS. This list is not exhaustive and only incorporates concepts that we did not have the time or resources to explore further.

- By using a continuous scale to recode ordinal survey response data, we assumed that the distance between each response category was meaningful and measurable, i.e. that a response of "Very Big" to a question about how much trust an individual had in an organization was twice as favorable as a response of "Big." By forgoing this assumption, the data can be ranked and analyzed separately from the constraints imposed by normality and homoscedasticity.
- The primary mission of JSOTF-P is to operate "by, with and through" the AFP as discussed in Section 1 to combat the spread of violent extremism in the region and establish a reputable fighting force capable of dealing with both internal and international threats. By modeling the significant relationships with *Trust in/Performance of the AFP*, the analysis can potentially provide JSOTF-P with tactical insights into how to better prepare the AFP to deal with these threats.
- Incorporating friendly-force significant activity (SIGACT) data into the modeling process has the benefit of getting closer to establishing causal relationships between friendly force actions and the subsequent effect of public opinion toward both the government and the insurgency. Using data from the Consolidated

Information Data Network Exchange (CIDNE) or similar database will demonstrate how the levels of *Trust in Government* or *Trust in Insurgency* vary in relation to friendly force level of effort in an area.

- An equally important facet of counterinsurgency is determining the significant factors involved in measuring a population's trust in the government. The same factors, modeling, and key driver analysis can be used to model the level of *Trust in/Performance of the GRP* or in the case of Cotabato, just *Trust in the GRP*. If the recommended survey changes are implemented in later survey waves, it is possible that the two facets, trust and performance of the GRP, could load onto different factors, enabling a separate trust model to be analyzed. If the changes are not implemented, the individual question concerning level of trust in the GRP can be used a standalone response variable.
- On several occasions in this effort, we have noted similarities between the six conflict affected areas in terms of the factor analysis, modeling results, and key driver results. We think it would be informative to decision makers at all levels to see if these similarities are significant when determining the relationships of each area with respect to trust in insurgency.

APPENDIX A. R CODE FOR DATA RECODING

```
library(xlsx)
library(car)

#1.  Binary aware/not aware
recodeBinary <- function(x){
  recode(x,
        '"AWARE" = 1;
        "Aware" = 1;
        "Not aware" = 0;
        "NOT AWARE" = 0;',
        as.factor.result=FALSE)
}

#2.  Two point question where "No" is preferred (negative)
recodeTwoNeg <- function(x){
  recode(x,
        '"NO" = 2;
        "YES" = -2; ',
        as.factor.result=FALSE)
}

#2a.  Two point question where "No" is preferred (positive)
recodeTwoPos <- function(x){
  recode(x,
        '"NO" = -2;
        "YES" = 2; ',
        as.factor.result=FALSE)
}

#3.  Three point question where "Most" is preferred (positive)
recodeThreePos <- function(x){
  recode(x,
        '"BETTER NOW" = 2;
        "Better now" = 2;
        "Gotten better" = 2;
        "NO CHANGE" = 0;
        "No change" = 0;
        "WORSE NOW" = -2;
        "BETTER THAN NOW" = 2;
        "Better than now" = 2;
        "SAME AS NOW" = 0;
        "Same as now" = 0;
        "Same as then" = 0;
        "Stayed the same" = 0;
        "WORSE THAN NOW" = -2;
        "Worse than now" = -2;
        "Worse now" = -2;
        "Gotten worse" = -2;
        "FOLLOWING PROCESSES GOVERNED BY PHILIPPINE LAWS" = 2;
        "FINANCIAL SETTLEMENT" = 0;
        "THROUGH A MEDIATOR" = 0;
```

```
        "FOLLOWING PROCESSES GOVERNED BY RELIGIOUS LAWS/ISLAMIC LAW" = -2;
        "THE GOVERNMENT COURTS IN OUR COUNTRY ARE USUALLY FAIR, PUNISHING THE GUILTY
AND FREEING THE INNOCENT" = 2;
        "The government courts in our country are usually fair, punishing the guilty and freeing the innocent" = 2;
        "THE RELIGIOUS COURTS (I.E SHARIA COURT) IN OUR COUNTRY ARE USUALLY FAIR,
PUNISHING THE GUILTY AND FREEING THE INNOCENT" = 2;
        "The religious courts (i.e Sharia Court) in our country are usually fair, punishing the guilty and freeing the
innocent" = 2;
        "NEITHER" = 0;
        "Neither" = 0;
        "THE GOVERNMENT COURTS IN OUR COUNTRY USUALLY FAVOR PEOPLE WITH MONEY AND
CONNECTIONS" = -2;
        "The government courts in our country usually favor people with money and connections" = -2;
        "THE RELIGIOUS COURTS (I.E SHARIA COURT) IN OUR COUNTRY USUALLY FAVOR PEOPLE
WITH MONEY AND CONNECTIONS" = -2;
        "The religious courts (i.e Sharia Court) in our country usually favor people with money and connections" = -2;
        "DONT KNOW" = NA;
        "Dont know" = NA;
        "Refused" = NA;
        "REFUSED" = NA; ',
        as.factor.result = FALSE)
}

#4.  Three point question where "Least" is preferred (negative)
recodeThreeNeg <- function(x){
  recode(x,
        "'GOTTEN WORSE" = -2;
        "Gotten worse" = -2;
        "STAYED THE SAME" = 0;
        "Stayed the same" = 0;
        "GOTTEN BETTER" = 2;
        "Gotten better" = 2;
        "DONT KNOW" = NA;
        "Dont know" = NA;
        "Dont Know" = NA;
        "REFUSED" = NA;
        "Refused" = NA;
        "NOT AWARE" = NA;
        "Not Aware" = NA;
        "Not aware" = NA;
        "WOULD APPROVE" = -2;
        "Would approve" = -2;
        "HAVE MIXED FEELINGS" = 0;
        "Have mixed feelings" = 0;
        "Would disapprove" = 2;
        "WOULD DISAPPROVE" = 2;
        "Don\'t know" = NA; ',
        as.factor.result=FALSE)
}

#5.  Four point question where "Most" is preferred (positive)
recodeFourPos <- function(x){
  recode(x,
        "'VERY EASY" = 2;
        "Very easy" = 2;
```

"FAIRLY EASY" = 1;
"Fairly easy" = 1;
"FAIRLY HARD" = -1;
"Fairly hard" = -1;
"VERY HARD" = -2;
"Very hard" = -2;
"DEFINITELY AGREE" = 2;
"Definitely Agree" = 2;
"Definitely agree" = 2;
"SOMEWHAT AGREE" = 1;
"Somewhat Agree" = 1;
"Somewhat agree" = 1;
"SOMEWHAT DISAGREE" = -1;
"Somewhat Disagree" = -1;
"Somewhat disagree" = -1;
"Somewhat disagree " = -1;
"DEFINITELY DISAGREE" = -2;
"Definitely Disagree" = -2;
"Definitely disagree" = -2;
"GREAT DEAL" = 2;
"Great deal" = 2;
"FAIR AMOUNT" = 1;
"Fair amount" = 1;
"NOT VERY MUCH" = -1;
"Not very much" = -1;
"NONE AT ALL" = -2;
"None at all" = -2;
"VERY SAFE" = 2;
"Very safe" = 2;
"FAIRLY SAFE" = 1;
"Fairly safe" = 1;
"NOT VERY SAFE" = -1;
"Not very safe" = -1;
"NOT SAFE AT ALL" = -2;
"Not safe at all" = -2;
"THE AFP IS MAKING THE SECURITY SITUATION A LOT BETTER" = 2;
"The AFP is making the security situation a lot better" = 2;
"THE AFP IS MAKING THE SECURITY SITUATION A LITTLE BETTER" = 1;
"The AFP is making the security situation a little better" = 1;
"THE AFP IS HAVING NO IMPACT ON THE SECURITY SITUATION" = -1;
"The AFP is having no impact on the security situation" = -1;
"THE AFP IS MAKING THE SECURITY SITUATION WORSE" = -2;
"The AFP is making the security situation worse" = -2;
"THE PHILIPPINE NATIONAL POLICE IS MAKING MY COMMUNITY A LOT SAFER" = 2;
"The Philippine National Police (PNP) are making my community a lot safer" = 2;
"THE PHILIPPINE NATIONAL POLICE IS MAKING MY COMMUNITY A LITTLE SAFER" = 1;
"The Philippine National Police (PNP) are making my community a little safer" = 1;
"THE PHILIPPINE NATIONAL POLIVE IS HAVING NO IMPACT ON SAFETY IN MY COMMUNITY" = -1;
"The Philippine National Police (PNP) are having no impact on safety in my community" = -1;
"THE PHILIPPINE NATIONAL POLICE IS MAKING MY COMMUNITY LESS SAFE" = -2;
"The Philippine National Police (PNP) are making my community less safe" = -2;
"A LOT SAFER" = 2;
"A lot safer" = 2;
"A LITTLE SAFER" = 1;

```
        "A little safer" = 1;
        "NO IMPACT" = -1;
        "No impact" = -1;
        "LESS SAFE" = -2;
        "Less safe" = -2;
        "DONT KNOW" = NA;
        "Dont know" = NA;
        "Dont Know" = NA;
        "Don\'t know" = NA;
        "Don\'t Know" = NA;
        "NOT AWARE" = NA;
        "Not Aware" = NA;
        "Not aware" = NA;
        "Refused" = NA;
        "" = NA;
        "Not present" = NA;
        "NOT PRESENT" = NA; ',
        as.factor.result=FALSE)
}

#6.  Four point question where "Least" is preferred (negative)
recodeFourNeg <- function(x){
  recode(x,
        "'DEFINITELY AGREE" = -2;
        "Definitely agree" = -2;
        "SOMEWHAT AGREE" = -1;
        "Somewhat agree" = -1;
        "SOMEWHAT DISAGREE" = 1;
        "Somewhat disagree" = 1;
        "DEFINITELY DISAGREE" = 2;
        "Definitely disagree" = 2;
        "" = NA;
        "DONT KNOW" = NA;
        "Dont know" = NA;
        "DON\'T KNOW" = NA;
        "Don\'t know" = NA;
        "Don\'t Know" = NA;
        "Refused" = NA;
        "REFUSED" = NA; ',
        as.factor.result=FALSE)
}

#7.  Five point question where "Most" is preferred (positive)
recodeFivePos <- function(x){
  recode(x,
        "'VERY BIG" = 2;
        "Very big" = 2;
        "BIG" = 1;
        "Big" = 1;
        "SOMEWHAT BIG / SOMEWHAT SMALL" = 0;
        "Somewhat big / somewhat small" = 0;
        "MAY BE BIG AND MAY BE SMALL" = 0;
        "SMALL" = -1;
        "Small" = -1;
        "VERY SMALL/NONE" = -2;
```

```
        "Very small/None" = -2;
        "EXCELLENT" = 2;
        "Excellent" = 2;
        "VERY GOOD" = 1;
        "Very Good" = 1;
        "NEITHER GOOD OR POOR" = 0;
        "Neither Good or Poor" = 0;
        "FAIR" = -1;
        "Fair" = -1;
        "POOR" = -2;
        "Poor" = -2;
        "EXTREMELY STRONGLY" = 2;
        "Extremely Strongly" = 2;
        "VERY STRONGLY" = 1;
        "Very Strongly" = 1;
        "NEITHER STRONG OR NOT STRONG" = 0;
        "Neither Strong or Not Strong" = 0;
        "Neither strong or not strong" = 0;
        "NOT VERY STRONGLY" = -1;
        "Not Very Strongly" = -1;
        "NOT STRONGLY AT ALL" = -2;
        "Not Strongly at All" = -2;
        "VERY WELL" = 1;
        "Very Well" = 1;
        "Neither good or poor" = 0;
        "NEITHER WELL OR NOT WELL" = 0;
        "Neither Well or Not Well" = 0;
        "Neither well or not well" = 0;
        "NOT VERY WELL" = -1;
        "Not Very Well" = -1;
        "NOT WELL AT ALL" = -2;
        "Not Well at All" = -2;
        "VERY EFFECTIVE" = 2;
        "EFFECTIVE" = 1;
        "MAY BE EFFECTIVE/MAY BE INEFFECTIVE" = 0;
        "INEFFECTIVE" = -1;
        "VERY INEFFECTIVE" = -2;
        "VERY SATISFIED" = 2;
        "SATISFIED" = 1;
        "SOMEWHAT SATISFIED/SOMEWHAT DISSATISFIED" = 0;
        "DISSATISFIED" = -1;
        "VERY DISSATISFIED" = -2;
        "VERY DISSATISFIED " = -2;
        "" = NA;
        "NOT AWARE" = NA;
        "REFUSED" = NA;
        "REFUSE" = NA;
        "Refuse" = NA;
        "Don\'t know" = NA;
        "Don\'t Know" = NA;
        "DONT KNOW" = NA;',
        as.factor.result=FALSE)
}

#8.  Five point question where "Least" is preferred (negative)
```

```
recodeFiveNeg <- function(x){
  recode(x,
        '"VERY BIG" = -2;
        "Very big" = -2;
        "BIG" = -1;
        "Big" = -1;
        "SOMEWHAT BIG / SOMEWHAT SMALL" = 0;
        "Somewhat big / somewhat small" = 0;
        "MAY BE BIG AND MAY BE SMALL" = 0;
        "SMALL" = 1;
        "Small" = 1;
        "VERY SMALL/NONE" = 2;
        "Very small/None" = 2;
        "GREAT DEAL" = -2;
        "Great deal" = -2;
        "FAIR AMOUNT" = -1;
        "Fair amount" = -1;
        "HAVEN\'T HEARD ENOUGH TO SAY" = 0;
        "Havent heard enough to say" = 0;
        "Haven\'t heard enough to say" = 0;
        "NOT VERY MUCH" = 1;
        "Not very much" = 1;
        "NONE AT ALL" = 2;
        "None at all" = 2;
        "" = NA;
        "REFUSE" = NA;
        "Refuse" = NA;
        "REFUSED" = NA;
        "Refused" = NA;
        "DONT KNOW" = NA;
        "Dont Know" = NA;
        "Dont know" = NA;
        "Don\'t know" = NA;
        "Don\'t Know" = NA;
        "Not Aware" = NA;
        "NOT AWARE" = NA; ',
        as.factor.result=FALSE)
}

#9. Question 44/62 is scaled 1-10 with 1 being preferred (positive)
recodeTenPos <- function(x){
  recode(x,
        '"1" = 2;
        "1_Very Clean" = 2;
        "1 Very clean" = 2;
        "2" = 1.5;
        "3" = 1;
        "4" = 0.5;
        "5" = 0;
        "6" = 0;
        "7" = -0.5;
        "8" = -1;
        "9" = -1.5;
        "10" = -2;
        "10_Very Corrupt" = -2;
```

```
        "10 Very corrupt" = -2;
        "DONT KNOW" = NA;
        "Dont know" = NA;
        "Refused" = NA;
        "" = NA;
        "REFUSED" = NA; ',
        as.factor.result=FALSE)
}

#10 Location
recodeLoc <- function(x){
  recode(x,
        '"COTABATO" = "Cotabato";
        "ISABELA" = "Isabela";
        "MARAWI" = "Marawi";
        "SOUTHERN BASILAN" = "Southern Basilan";
        "SULU" = "Sulu";
        "ZAMBOANGA" = "Zamboanga"; ',
        as.factor.result=TRUE)
}

#11 Gender
recodeGen <- function(x){
  recode(x,
        '"MALE" = "Male";
        "FEMALE" = "Female"; ',
        as.factor.result=TRUE)
}

#12 Agegroup
recodeAge <- function(x){
  recode(x,
        '"Age 18-19 years old" = "18-19";
        "Age 20-24 years old" = "20-24";
        "Age 25-29 years old" = "25-29";
        "Age 30-34 years old" = "30-34";
        "Age 35-39 years old" = "35-39";
        "Age 40-44 years old" = "40-44";
        "Age 45-49 years old" = "45-49";
        "Age 50-54 years old" = "50-54";
        "Age 55-59 years old" = "55-59";
        "Age 60-64 years old" = "60-64";
        "Age 65 & up years old" = "Over 64";
        "65 YEARS & UP" = "Over 64";
        "65 years & up" = "Over 64"; ',
        as.factor.result=TRUE)
}

#13 Religion
recodeRel <- function(x){
  recode(x,
        '"ISLAM" = "Islam";
        "ROMAN CATHOLIC" = "Roman Catholic";
        "AGLIPAYAN" = "Other";
        "Aglipayan" = "Other";
```

```
        "ALIANCE" = "Other";
        "Aliance" = "Other";
        "ALLIANCE BAPTIST CHURCH" = "Other";
        "Alliance Baptist Church" = "Other";
        "BIBLE BAPTIST" = "Other";
        "Bible Baptist" = "Other";
        "Baptist" = "Other";
        "BORN AGAIN" = "Other";
        "Born Again" = "Other";
        "BUDDHIST" = "Other";
        "Buddhist" = "Other";
        "Church of Christ" = "Other";
        "Church of Jesus Christ" = "Other";
        "CHURCH OF GOD" = "Other";
        "Christian" = "Other";
        "CHRISTIAN MISSIONARY ALLIANCE CHURCH (AMACOP)" = "Other";
        "EPISCOPAL" = "Other";
        "Episcopal" = "Other";
        "EVANGELICAL" = "Other";
        "Evangelical" = "Other";
        "IGLESIA NI CRISTO" = "Other";
        "Iglesia ni Cristo" = "Other";
        "INDEPENDENT BAPTIST CHURCH" = "Other";
        "Is" = "Other";
        "JEHOVAHS WITNESS" = "Other";
        "Jehovahs Witness" = "Other";
        "Jehovah\'s Witness" = "Other";
        "JIL Christian Fellowship" = "Other";
        "KRISTOHANON" = "Other";
        "Later Day Saints" = "Other";
        "METHODIST" = "Other";
        "Methodist" = "Other";
        "Mormones" = "Other";
        "None" = "Other";
        "ORTHODOX CATHOLIC" = "Other";
        "Pagan" = "Other";
        "PENTECOSTAL" = "Other";
        "Pentecostal" = "Other";
        "PROTESTANT" = "Other";
        "Protestant" = "Other";
        "Religion Alliance Christian" = "Other";
        "Seventh Day Adventist" = "Other";
        "THE WAY OF SALVATION CHURCH" = "Other";
        "REFUSED" = "Other";
        "" = "Other"; ',
        as.factor.result = TRUE)
}

#14 Class
recodeClass <- function(x) {
  recode(x,
        "'EXCLUSIVE" = "ABC";
        "Exclusive" = "ABC";
        "NON-EXCLUSIVE" = "ABC";
        "Non-exclusive" = "ABC";
```

```
        "C1" = "ABC";
        "C2" = "ABC";
        "D1 (own lot)" = "D1";
        "D1 (OWN LOT)" = "D1";
        "D2 (not own lot)" = "D2";
        "D2 (NOT OWN LOT)" = "D2";
        "E" = "E"; ',
        as.factor.result = TRUE)
}

## Add in the Wave variable

Wave2 <- data.frame(rep(2,nrow(wave2)))
names(Wave2) <- c("WAVE")
Wave3 <- data.frame(rep(3,nrow(wave3)))
names(Wave3) <- c("WAVE")
Wave4 <- data.frame(rep(4,nrow(wave4)))
names(Wave4) <- c("WAVE")

w2data <- cbind(w2data,Wave2)
w3data <- cbind(w3data,Wave3)
w4data <- cbind(w4data,Wave4)

w2data$WAVE <- as.factor(w2data$WAVE)
w3data$WAVE <- as.factor(w3data$WAVE)
w4data$WAVE <- as.factor(w4data$WAVE)

## Get rid of " ’ " with " ' "

w3data$Q88B <- gsub("’","",w3data$Q88B)
w4data$Q66 <- gsub("’","",w4data$Q66)

w4data$Q68.NPA <- gsub("’","",w4data$Q68.NPA)
w4data$Q68.MILF <- gsub("’","",w4data$Q68.MILF)
w4data$Q68.BIFF <- gsub("’","",w4data$Q68.BIFF)
w4data$Q68.ASG <- gsub("’","",w4data$Q68.ASG)
w4data$Q68.ALQAIDA <- gsub("’","",w4data$Q68.ALQAIDA)
w4data$Q68.JI <- gsub("’","",w4data$Q68.JI)
w4data$Q68.MNLF <- gsub("’","",w4data$Q68.MNLF)

w4data$Q77.NPA <- gsub("’","",w4data$Q77.NPA)
w4data$Q77.MILF <- gsub("’","",w4data$Q77.MILF)
w4data$Q77.BIFF <- gsub("’","",w4data$Q77.BIFF)
w4data$Q77.ASG <- gsub("’","",w4data$Q77.ASG)
w4data$Q77.ALQAIDA <- gsub("’","",w4data$Q77.ALQAIDA)
w4data$Q77.JI <- gsub("’","",w4data$Q77.JI)
w4data$Q77.MNLF <- gsub("’","",w4data$Q77.MNLF)

w4data$Q80.CAFGU <- gsub("’","",w4data$Q80.CAFGU)
w4data$Q80.CVO <- gsub("’","",w4data$Q80.CVO)

w4data$Q82 <- gsub("’","",w4data$Q82)

## Recode wave 2 questions
```

```
w2data$Q1 <- as.numeric(recodeThreePos(w2data$Q1))
w2data$Q2 <- as.numeric(recodeThreePos(w2data$Q2))
#w2data$Q6.A <- as.numeric(recodeBinary(w2data$Q6.A)) # Abu Sayyaf
w2data$Q6.B <- as.numeric(recodeBinary(w2data$Q6.B)) # Al Qaida
#w2data$Q6.C <- as.numeric(recodeBinary(w2data$Q6.C)) # AFP
w2data$Q6.D <- as.numeric(recodeBinary(w2data$Q6.D)) # AusAID
w2data$Q6.E <- as.numeric(recodeBinary(w2data$Q6.E)) # BIFF
#w2data$Q6.F <- as.numeric(recodeBinary(w2data$Q6.F)) # CAFGU
#w2data$Q6.G <- as.numeric(recodeBinary(w2data$Q6.G)) # Govt of the Philippines
w2data$Q6.H <- as.numeric(recodeBinary(w2data$Q6.H)) # JICA
w2data$Q6.I <- as.numeric(recodeBinary(w2data$Q6.I)) # Jemaah Islamiya
#w2data$Q6.J <- as.numeric(recodeBinary(w2data$Q6.J)) # MILF
#w2data$Q6.K <- as.numeric(recodeBinary(w2data$Q6.K)) # MNLF
#w2data$Q6.L <- as.numeric(recodeBinary(w2data$Q6.L)) # New People's Army (NPA)
#w2data$Q6.M <- as.numeric(recodeBinary(w2data$Q6.M)) # Philippine Air Force
#w2data$Q6.N <- as.numeric(recodeBinary(w2data$Q6.N)) # Philippine Marines
#w2data$Q6.O <- as.numeric(recodeBinary(w2data$Q6.O)) # PNP
#w2data$Q6.P <- as.numeric(recodeBinary(w2data$Q6.P)) # PNP - Special Action Force
w2data$Q6.Q <- as.numeric(recodeBinary(w2data$Q6.Q)) # USAID
w2data$Q6.R <- as.numeric(recodeBinary(w2data$Q6.R)) # U.S. Govt/U.S. Forces
w2data$Q7.A <- as.numeric(recodeFiveNeg(w2data$Q7.A)) # Abu Sayyaf
w2data$Q7.B <- as.numeric(recodeFiveNeg(w2data$Q7.B)) # Al Qaida
w2data$Q7.C <- as.numeric(recodeFivePos(w2data$Q7.C)) # AFP
w2data$Q7.D <- as.numeric(recodeFivePos(w2data$Q7.D)) # AusAID
w2data$Q7.E <- as.numeric(recodeFiveNeg(w2data$Q7.E)) # BIFF
w2data$Q7.F <- as.numeric(recodeFivePos(w2data$Q7.F)) # CAFGU
w2data$Q7.G <- as.numeric(recodeFivePos(w2data$Q7.G)) # Govt of the Philippines
w2data$Q7.H <- as.numeric(recodeFivePos(w2data$Q7.H)) # JICA
w2data$Q7.I <- as.numeric(recodeFiveNeg(w2data$Q7.I)) # Jemaah Islamiya
w2data$Q7.J <- as.numeric(recodeFiveNeg(w2data$Q7.J)) # MILF
w2data$Q7.K <- as.numeric(recodeFiveNeg(w2data$Q7.K)) # MNLF
w2data$Q7.L <- as.numeric(recodeFiveNeg(w2data$Q7.L)) # New People's Army (NPA)
w2data$Q7.M <- as.numeric(recodeFivePos(w2data$Q7.M)) # Philippine Air Force
w2data$Q7.N <- as.numeric(recodeFivePos(w2data$Q7.N)) # Philippine Marines
w2data$Q7.O <- as.numeric(recodeFivePos(w2data$Q7.O)) # PNP
w2data$Q7.P <- as.numeric(recodeFivePos(w2data$Q7.P)) # PNP - Special Action Force
w2data$Q7.Q <- as.numeric(recodeFivePos(w2data$Q7.Q)) # USAID
w2data$Q7.R <- as.numeric(recodeFivePos(w2data$Q7.R)) # U.S. Govt/U.S. Forces
w2data$Q14.GRP <- as.numeric(recodeFivePos(w2data$Q14.GRP)) # GRP
w2data$Q14.AFP <- as.numeric(recodeFivePos(w2data$Q14.AFP)) # AFP
w2data$Q14.PNP <- as.numeric(recodeFivePos(w2data$Q14.PNP)) # PNP
w2data$Q14.CAFGU <- as.numeric(recodeFivePos(w2data$Q14.CAFGU)) # CAFGU
w2data$Q15.GRP <- as.numeric(recodeFivePos(w2data$Q15.GRP)) # GRP
w2data$Q15.AFP <- as.numeric(recodeFivePos(w2data$Q15.AFP)) # AFP
w2data$Q15.PNP <- as.numeric(recodeFivePos(w2data$Q15.PNP)) # PNP
w2data$Q15.CAFGU <- as.numeric(recodeFivePos(w2data$Q15.CAFGU)) # CAFGU
w2data$Q16.GRP <- as.numeric(recodeFivePos(w2data$Q16.GRP)) # GRP
w2data$Q16.AFP <- as.numeric(recodeFivePos(w2data$Q16.AFP)) # AFP
w2data$Q16.PNP <- as.numeric(recodeFivePos(w2data$Q16.PNP)) # PNP
w2data$Q16.CAFGU <- as.numeric(recodeFivePos(w2data$Q16.CAFGU)) # CAFGU
w2data$Q17.A <- as.numeric(recodeFivePos(w2data$Q17.A)) # Education Services
w2data$Q17.B <- as.numeric(recodeFivePos(w2data$Q17.B)) # Health/Medical Services
w2data$Q17.C <- as.numeric(recodeFivePos(w2data$Q17.C)) # Livelihood Services
w2data$Q17.D <- as.numeric(recodeFivePos(w2data$Q17.D)) # Water Services
w2data$Q17.E <- as.numeric(recodeFivePos(w2data$Q17.E)) # Electricity Services
```

```
w2data$Q17.F <- as.numeric(recodeFivePos(w2data$Q17.F)) # Transportation Services
w2data$Q17.G <- as.numeric(recodeFivePos(w2data$Q17.G)) # Security Services
w2data$Q27 <- as.numeric(recodeFourPos(w2data$Q27))
w2data$Q28.A <- as.numeric(recodeFourPos(w2data$Q28.A))
w2data$Q28.B <- as.numeric(recodeFourPos(w2data$Q28.B))
w2data$Q28.C <- as.numeric(recodeFourPos(w2data$Q28.C))
w2data$Q39.A <- as.numeric(recodeFourPos(w2data$Q39.A)) # President and his Cabinet
w2data$Q39.B <- as.numeric(recodeFourPos(w2data$Q39.B)) # Senate
w2data$Q39.C <- as.numeric(recodeFourPos(w2data$Q39.C)) # Congress
w2data$Q39.D <- as.numeric(recodeFourPos(w2data$Q39.D)) # Legal System/Courts
w2data$Q39.E <- as.numeric(recodeFourPos(w2data$Q39.E)) # Provincial Government
w2data$Q39.F <- as.numeric(recodeFourPos(w2data$Q39.F)) # City/Town Government
w2data$Q39.G <- as.numeric(recodeFourPos(w2data$Q39.G)) # Barangay
w2data$Q40.A <- as.numeric(recodeFourPos(w2data$Q40.A)) # GRP
w2data$Q40.B <- as.numeric(recodeFourPos(w2data$Q40.B)) # AFP
w2data$Q40.C <- as.numeric(recodeFourPos(w2data$Q40.C)) # PNP
w2data$Q43 <- as.numeric(recodeThreeNeg(w2data$Q43))
w2data$Q44.A <- as.numeric(recodeTenPos(w2data$Q44.A)) # National Government
w2data$Q44.B <- as.numeric(recodeTenPos(w2data$Q44.B)) # Provincial Government
w2data$Q44.C <- as.numeric(recodeTenPos(w2data$Q44.C)) # City/Town Government
w2data$Q44.D <- as.numeric(recodeTenPos(w2data$Q44.D)) # Courts
w2data$Q44.E <- as.numeric(recodeTenPos(w2data$Q44.E)) # President
w2data$Q44.F <- as.numeric(recodeTenPos(w2data$Q44.F)) # President's Family
w2data$Q44.G <- as.numeric(recodeTenPos(w2data$Q44.G)) # Senate
w2data$Q44.H <- as.numeric(recodeTenPos(w2data$Q44.H)) # House of Representatives/Congress
w2data$Q44.I <- as.numeric(recodeTenPos(w2data$Q44.I)) # AFP
w2data$Q44.J <- as.numeric(recodeTenPos(w2data$Q44.J)) # PNP
w2data$Q44.K <- as.numeric(recodeTenPos(w2data$Q44.K)) # BBO
w2data$Q54 <- as.numeric(recodeFourPos(w2data$Q54))
w2data$Q55.A <- as.numeric(recodeFiveNeg(w2data$Q55.A)) # NPA
w2data$Q55.B <- as.numeric(recodeFiveNeg(w2data$Q55.B)) # MILF
w2data$Q55.C <- as.numeric(recodeFiveNeg(w2data$Q55.C)) # BIFF (727 Not Aware)
w2data$Q55.D <- as.numeric(recodeFiveNeg(w2data$Q55.D)) # Abu Sayyaf
w2data$Q55.E <- as.numeric(recodeFiveNeg(w2data$Q55.E)) # Al Qaida (1278 Not Aware)
w2data$Q55.F <- as.numeric(recodeFiveNeg(w2data$Q55.F)) # Jemaah Islamiya (914 Not Aware)
w2data$Q55.G <- as.numeric(recodeFiveNeg(w2data$Q55.G)) # MNLF
w2data$Q59.A <- as.numeric(recodeThreeNeg(w2data$Q59.A)) # NPA
w2data$Q59.B <- as.numeric(recodeThreeNeg(w2data$Q59.B)) # MILF
w2data$Q59.C <- as.numeric(recodeThreeNeg(w2data$Q59.C)) # BIFF (799 Not Aware)
w2data$Q59.D <- as.numeric(recodeThreeNeg(w2data$Q59.D)) # Abu Sayyaf
w2data$Q59.E <- as.numeric(recodeThreeNeg(w2data$Q59.E)) # Al Qaida (1362 Not Aware)
w2data$Q59.F <- as.numeric(recodeThreeNeg(w2data$Q59.F)) # Jemaah Islamiya (947 Not Aware)
w2data$Q59.G <- as.numeric(recodeThreeNeg(w2data$Q59.G)) # MNLF
w2data$Q62 <- as.numeric(recodeFourPos(w2data$Q62))
w2data$Q64.A <- as.numeric(recodeFourPos(w2data$Q64.A)) # Philippine Marines
w2data$Q64.B <- as.numeric(recodeFourPos(w2data$Q64.B)) # CAFGU
w2data$Q64.C <- as.numeric(recodeFourPos(w2data$Q64.C)) # CVO
w2data$Q64.D <- as.numeric(recodeFourPos(w2data$Q64.D)) # Barangay Tanods
w2data$Q71 <- as.numeric(recodeFourNeg(w2data$Q71))
w2data$LOCATION <- as.factor(recodeLoc(w2data$LOCATION))
w2data$GENDER <- as.factor(recodeGen(w2data$GENDER))
w2data$AGEGROUP <- as.factor(recodeAge(w2data$AGEGROUP))
w2data$RELIGION <- as.factor(recodeRel(w2data$RELIGION))
w2data$CLASS <- as.factor(recodeClass(w2data$CLASS))
w2data$WAVE <- as.factor(w2data$WAVE)
```

```
## Recode wave 3 questions

w3data$Q1 <- as.numeric(recodeThreePos(w3data$Q1))
w3data$Q2 <- as.numeric(recodeThreePos(w3data$Q2))
#w3data$Q6.A <- as.numeric(recodeBinary(w3data$Q6.A)) # Abu Sayyaf
w3data$Q6.B <- as.numeric(recodeBinary(w3data$Q6.B)) # Al Qaida (1362 Not Aware)
#w3data$Q6.C <- as.numeric(recodeBinary(w3data$Q6.C)) # AFP
w3data$Q6.D <- as.numeric(recodeBinary(w3data$Q6.D)) # AusAID
w3data$Q6.E <- as.numeric(recodeBinary(w3data$Q6.E)) # BIFF (799 Not Aware)
#w3data$Q6.F <- as.numeric(recodeBinary(w3data$Q6.F)) # CAFGU
#w3data$Q6.G <- as.numeric(recodeBinary(w3data$Q6.G)) # Govt of the Philippines
w3data$Q6.H <- as.numeric(recodeBinary(w3data$Q6.H)) # JICA
w3data$Q6.I <- as.numeric(recodeBinary(w3data$Q6.I)) # Jemaah Islamiya (947 Not Aware)
#w3data$Q6.J <- as.numeric(recodeBinary(w3data$Q6.J)) # MILF
#w3data$Q6.K <- as.numeric(recodeBinary(w3data$Q6.K)) # MNLF
#w3data$Q6.L <- as.numeric(recodeBinary(w3data$Q6.L)) # New People's Army (NPA)
#w3data$Q6.M <- as.numeric(recodeBinary(w3data$Q6.M)) # Philippine Air Force
#w3data$Q6.N <- as.numeric(recodeBinary(w3data$Q6.N)) # Philippine Marines
#w3data$Q6.O <- as.numeric(recodeBinary(w3data$Q6.O)) # PNP
#w3data$Q6.P <- as.numeric(recodeBinary(w3data$Q6.P)) # PNP - Special Action Force
w3data$Q6.Q <- as.numeric(recodeBinary(w3data$Q6.Q)) #USAID
w3data$Q6.R <- as.numeric(recodeBinary(w3data$Q6.R)) # U.S. Govt/U.S. Forces (395 Not Aware)
w3data$Q7.A <- as.numeric(recodeFiveNeg(w3data$Q7.A)) # Abu Sayyaf
w3data$Q7.B <- as.numeric(recodeFiveNeg(w3data$Q7.B)) # Al Qaida (1362 Not Aware)
w3data$Q7.C <- as.numeric(recodeFivePos(w3data$Q7.C)) # AFP
w3data$Q7.D <- as.numeric(recodeFivePos(w3data$Q7.D)) # AusAID
w3data$Q7.E <- as.numeric(recodeFiveNeg(w3data$Q7.E)) # BIFF (799 Not Aware)
w3data$Q7.F <- as.numeric(recodeFivePos(w3data$Q7.F)) # CAFGU
w3data$Q7.G <- as.numeric(recodeFivePos(w3data$Q7.G)) # Govt of the Philippines
w3data$Q7.H <- as.numeric(recodeFivePos(w3data$Q7.H)) # JICA
w3data$Q7.I <- as.numeric(recodeFiveNeg(w3data$Q7.I)) # Jemaah Islamiya (947 Not Aware)
w3data$Q7.J <- as.numeric(recodeFiveNeg(w3data$Q7.J)) # MILF
w3data$Q7.K <- as.numeric(recodeFiveNeg(w3data$Q7.K)) # MNLF
w3data$Q7.L <- as.numeric(recodeFiveNeg(w3data$Q7.L)) # New People's Army (NPA)
w3data$Q7.M <- as.numeric(recodeFivePos(w3data$Q7.M)) # Philippine Air Force
w3data$Q7.N <- as.numeric(recodeFivePos(w3data$Q7.N)) # Philippine Marines
w3data$Q7.O <- as.numeric(recodeFivePos(w3data$Q7.O)) # PNP
w3data$Q7.P <- as.numeric(recodeFivePos(w3data$Q7.P)) # PNP - Special Action Force
w3data$Q7.Q <- as.numeric(recodeFivePos(w3data$Q7.Q)) # USAID
w3data$Q7.R <- as.numeric(recodeFivePos(w3data$Q7.R)) # U.S. Govt/U.S. Forces (395 Not Aware)
w3data$Q14.GRP <- as.numeric(recodeFivePos(w3data$Q14.GRP)) # GRP
w3data$Q14.AFP <- as.numeric(recodeFivePos(w3data$Q14.AFP)) # AFP
w3data$Q14.PNP <- as.numeric(recodeFivePos(w3data$Q14.PNP)) # PNP
w3data$Q14.CAFGU <- as.numeric(recodeFivePos(w3data$Q14.CAFGU)) # CAFGU
w3data$Q15.GRP <- as.numeric(recodeFivePos(w3data$Q15.GRP)) # GRP
w3data$Q15.AFP <- as.numeric(recodeFivePos(w3data$Q15.AFP)) # AFP
w3data$Q15.PNP <- as.numeric(recodeFivePos(w3data$Q15.PNP)) # PNP
w3data$Q15.CAFGU <- as.numeric(recodeFivePos(w3data$Q15.CAFGU)) # CAFGU
w3data$Q16.GRP <- as.numeric(recodeFivePos(w3data$Q16.GRP)) # GRP
w3data$Q16.AFP <- as.numeric(recodeFivePos(w3data$Q16.AFP)) # AFP
w3data$Q16.PNP <- as.numeric(recodeFivePos(w3data$Q16.PNP)) # PNP
w3data$Q16.CAFGU <- as.numeric(recodeFivePos(w3data$Q16.CAFGU)) # CAFGU
w3data$Q35.A <- as.numeric(recodeFivePos(w3data$Q35.A)) # Education Services
w3data$Q35.B <- as.numeric(recodeFivePos(w3data$Q35.B)) # Health/Medical Services
```

```
w3data$Q35.C <- as.numeric(recodeFivePos(w3data$Q35.C)) # Livelihood Services
w3data$Q35.D <- as.numeric(recodeFivePos(w3data$Q35.D)) # Water Services
w3data$Q35.E <- as.numeric(recodeFivePos(w3data$Q35.E)) # Electricity Services
w3data$Q35.F <- as.numeric(recodeFivePos(w3data$Q35.F)) # Transportation Services
w3data$Q35.G <- as.numeric(recodeFivePos(w3data$Q35.G)) # Security Services
w3data$Q41 <- as.numeric(recodeFourPos(w3data$Q41))
w3data$Q42.A <- as.numeric(recodeFourPos(w3data$Q42.A)) # GRP
w3data$Q42.B <- as.numeric(recodeFourPos(w3data$Q42.B)) # AFP
w3data$Q42.C <- as.numeric(recodeFourPos(w3data$Q42.C)) # PNP
w3data$Q57.A <- as.numeric(recodeFourPos(w3data$Q57.A)) # President and his Cabinet
w3data$Q57.C <- as.numeric(recodeFourPos(w3data$Q57.C)) # Congress
w3data$Q57.D <- as.numeric(recodeFourPos(w3data$Q57.D)) # Legal System/Courts
w3data$Q57.E <- as.numeric(recodeFourPos(w3data$Q57.E)) # Provincial Government
w3data$Q57.F <- as.numeric(recodeFourPos(w3data$Q57.F)) # City/Town Government
w3data$Q57.G <- as.numeric(recodeFourPos(w3data$Q57.G)) # Barangay
w3data$Q57.H <- as.numeric(recodeFourPos(w3data$Q57.H)) # Domestic Media
w3data$Q58.A <- as.numeric(recodeFourPos(w3data$Q58.A)) # Civil Service / Government Workers
w3data$Q58.B <- as.numeric(recodeFourPos(w3data$Q58.B)) # Religious leaders
w3data$Q58.C <- as.numeric(recodeFourPos(w3data$Q58.C)) # NGOs
w3data$Q61 <- as.numeric(recodeThreeNeg(w3data$Q61))
w3data$Q62.A <- as.numeric(recodeTenPos(w3data$Q62.A)) # National Government
w3data$Q62.B <- as.numeric(recodeTenPos(w3data$Q62.B)) # Provincial Government
w3data$Q62.C <- as.numeric(recodeTenPos(w3data$Q62.C)) # City/Town Government
w3data$Q62.D <- as.numeric(recodeTenPos(w3data$Q62.D)) # Courts
w3data$Q62.E <- as.numeric(recodeTenPos(w3data$Q62.E)) # President
w3data$Q62.F <- as.numeric(recodeTenPos(w3data$Q62.F)) # President's Family
w3data$Q62.G <- as.numeric(recodeTenPos(w3data$Q62.G)) # Senate
w3data$Q62.H <- as.numeric(recodeTenPos(w3data$Q62.H)) # House of Representatives/Congress
w3data$Q62.I <- as.numeric(recodeTenPos(w3data$Q62.I)) # AFP
w3data$Q62.J <- as.numeric(recodeTenPos(w3data$Q62.J)) # PNP
w3data$Q62.K <- as.numeric(recodeTenPos(w3data$Q62.K)) # Big business owners
w3data$Q65 <- as.numeric(recodeFourPos(w3data$Q65))
w3data$Q66 <- as.numeric(recodeFourPos(w3data$Q66))
w3data$Q68.A <- as.numeric(recodeFiveNeg(w3data$Q68.A)) # NPA
w3data$Q68.B <- as.numeric(recodeFiveNeg(w3data$Q68.B)) # MILF
w3data$Q68.C <- as.numeric(recodeFiveNeg(w3data$Q68.C)) # BIFF (727 Not Aware)
w3data$Q68.D <- as.numeric(recodeFiveNeg(w3data$Q68.D)) # Abu Sayyaf
w3data$Q68.E <- as.numeric(recodeFiveNeg(w3data$Q68.E)) # Al Qaida (1278 Not Aware)
w3data$Q68.F <- as.numeric(recodeFiveNeg(w3data$Q68.F)) # Jemaah Islamiya (914 Not Aware)
w3data$Q68.G <- as.numeric(recodeFiveNeg(w3data$Q68.G)) # MNLF
w3data$Q77.A <- as.numeric(recodeThreeNeg(w3data$Q77.A)) # NPA
w3data$Q77.B <- as.numeric(recodeThreeNeg(w3data$Q77.B)) # MILF
w3data$Q77.C <- as.numeric(recodeThreeNeg(w3data$Q77.C)) # BIFF (799 Not Aware)
w3data$Q77.D <- as.numeric(recodeThreeNeg(w3data$Q77.D)) # Abu Sayyaf
w3data$Q77.E <- as.numeric(recodeThreeNeg(w3data$Q77.E)) # Al Qaida (1362 Not Aware)
w3data$Q77.F <- as.numeric(recodeThreeNeg(w3data$Q77.F)) # Jemaah Islamiya (947 Not Aware)
w3data$Q77.G <- as.numeric(recodeThreeNeg(w3data$Q77.G)) # MNLF
w3data$Q80.A <- as.numeric(recodeFourPos(w3data$Q80.A)) # Philippine Marines
w3data$Q80.B <- as.numeric(recodeFourPos(w3data$Q80.B)) # CAFGU
w3data$Q80.C <- as.numeric(recodeFourPos(w3data$Q80.C)) # CVO
w3data$Q80.D <- as.numeric(recodeFourPos(w3data$Q80.D)) # Barangay Tanods
w3data$Q88B <- as.numeric(recodeFourNeg(w3data$Q88B))
w3data$LOCATION <- as.factor(recodeLoc(w3data$LOCATION))
w3data$GENDER <- as.factor(recodeGen(w3data$GENDER))
w3data$AGEGROUP <- as.factor(recodeAge(w3data$AGEGROUP))
```

```
w3data$RELIGION <- as.factor(recodeRel(w3data$RELIGION))
w3data$CLASS <- as.factor(recodeClass(w3data$CLASS))
w3data$WAVE <- as.factor(w3data$WAVE)

## Recode wave 4 questions

w4data$Q1 <- as.numeric(recodeThreePos(w4data$Q1))
w4data$Q2 <- as.numeric(recodeThreePos(w4data$Q2))
#w4data$Q6.ASG <- as.numeric(recodeBinary(w4data$Q6.ASG)) # Abu Sayyaf
w4data$Q6.ALQAIDA <- as.numeric(recodeBinary(w4data$Q6.ALQAIDA)) # Al Qaida (1362 Not Aware)
#w4data$Q6.AFP <- as.numeric(recodeBinary(w4data$Q6.AFP)) # AFP
w4data$Q6.AusAID <- as.numeric(recodeBinary(w4data$Q6.AusAID)) # Australian AID
w4data$Q6.BIFF <- as.numeric(recodeBinary(w4data$Q6.BIFF)) # BIFF (799 Not Aware)
#w4data$Q6.CAFGU <- as.numeric(recodeBinary(w4data$Q6.CAFGU)) # CAFGU
#w4data$Q6.GRP <- as.numeric(recodeBinary(w4data$Q6.GRP)) # Govt of the Philippines
w4data$Q6.JICA <- as.numeric(recodeBinary(w4data$Q6.JICA)) # JICA
w4data$Q6.JI <- as.numeric(recodeBinary(w4data$Q6.JI)) # Jemaah Islamiya (947 Not Aware)
#w4data$Q6.MILF <- as.numeric(recodeBinary(w4data$Q6.MILF)) # MILF
#w4data$Q6.MNLF <- as.numeric(recodeBinary(w4data$Q6.MNLF)) # MNLF
#w4data$Q6.NPA <- as.numeric(recodeBinary(w4data$Q6.NPA)) # New People's Army (NPA)
#w4data$Q6.PAF <- as.numeric(recodeBinary(w4data$Q6.PAF)) # Philippine Air Force
#w4data$Q6.PHILMARINES <- as.numeric(recodeBinary(w4data$Q6.PHILMARINES)) # Philippine Marines
#w4data$Q6.PNP <- as.numeric(recodeBinary(w4data$Q6.PNP)) # PNP
#w4data$Q6.PNPSAF <- as.numeric(recodeBinary(w4data$Q6.PNPSAF)) # PNP - Special Action Force
w4data$Q6.USAID <- as.numeric(recodeBinary(w4data$Q6.USAID)) # USAID
w4data$Q6.USFORCES <- as.numeric(recodeBinary(w4data$Q6.USFORCES)) # U.S. Govt/U.S. Forces (395 Not
Aware)
w4data$Q7.ASG <- as.numeric(recodeFiveNeg(w4data$Q7.ASG)) # Abu Sayyaf
w4data$Q7.ALQAIDA <- as.numeric(recodeFiveNeg(w4data$Q7.ALQAIDA)) # Al Qaida
w4data$Q7.AFP <- as.numeric(recodeFivePos(w4data$Q7.AFP)) # AFP
w4data$Q7.AusAID <- as.numeric(recodeFivePos(w4data$Q7.AusAID)) # Australian AId
w4data$Q7.BIFF <- as.numeric(recodeFiveNeg(w4data$Q7.BIFF)) # BIFF
w4data$Q7.CAFGU <- as.numeric(recodeFivePos(w4data$Q7.CAFGU)) # CAFGU
w4data$Q7.GRP <- as.numeric(recodeFivePos(w4data$Q7.GRP)) # Govt of the Philippines
w4data$Q7.JICA <- as.numeric(recodeFivePos(w4data$Q7.JICA)) # JICA
w4data$Q7.JI <- as.numeric(recodeFiveNeg(w4data$Q7.JI)) # Jemaah Islamiya
w4data$Q7.MILF <- as.numeric(recodeFiveNeg(w4data$Q7.MILF)) # MILF
w4data$Q7.MNLF <- as.numeric(recodeFiveNeg(w4data$Q7.MNLF)) # MNLF
w4data$Q7.NPA <- as.numeric(recodeFiveNeg(w4data$Q7.NPA)) # New People's Army (NPA)
w4data$Q7.PAF <- as.numeric(recodeFivePos(w4data$Q7.PAF)) # Philippine Air Force
w4data$Q7.PHILMARINES <- as.numeric(recodeFivePos(w4data$Q7.PHILMARINES)) # Philippine Marines
w4data$Q7.PNP <- as.numeric(recodeFivePos(w4data$Q7.PNP)) # PNP
w4data$Q7.PNPSAF <- as.numeric(recodeFivePos(w4data$Q7.PNPSAF)) # PNP - Special Action Force
w4data$Q7.USAID <- as.numeric(recodeFivePos(w4data$Q7.USAID)) # USAID
w4data$Q7.USFORCES <- as.numeric(recodeFivePos(w4data$Q7.USFORCES)) # U.S. Govt/U.S. ForceS
w4data$Q14.GRP <- as.numeric(recodeFivePos(w4data$Q14.GRP)) # GRP
w4data$Q14.AFP <- as.numeric(recodeFivePos(w4data$Q14.AFP)) # AFP
w4data$Q14.PNP <- as.numeric(recodeFivePos(w4data$Q14.PNP)) # PNP
w4data$Q14.CAFGU <- as.numeric(recodeFivePos(w4data$Q14.CAFGU)) # CAFGU
w4data$Q15.GRP <- as.numeric(recodeFivePos(w4data$Q15.GRP)) # GRP
w4data$Q15.AFP <- as.numeric(recodeFivePos(w4data$Q15.AFP)) # AFP
w4data$Q15.PNP <- as.numeric(recodeFivePos(w4data$Q15.PNP)) # PNP
w4data$Q15.CAFGU <- as.numeric(recodeFivePos(w4data$Q15.CAFGU)) # CAFGU
w4data$Q16.GRP <- as.numeric(recodeFivePos(w4data$Q16.GRP)) # GRP
w4data$Q16.AFP <- as.numeric(recodeFivePos(w4data$Q16.AFP)) # AFP
```

```
w4data$Q16.PNP <- as.numeric(recodeFivePos(w4data$Q16.PNP)) # PNP
w4data$Q16.CAFGU <- as.numeric(recodeFivePos(w4data$Q16.CAFGU)) # CAFGU
w4data$Q35.A <- as.numeric(recodeFivePos(w4data$Q35.A)) # Education Services
w4data$Q35.B <- as.numeric(recodeFivePos(w4data$Q35.B)) # Health/Medical Services
w4data$Q35.C <- as.numeric(recodeFivePos(w4data$Q35.C)) # Livelihood Services
w4data$Q35.D <- as.numeric(recodeFivePos(w4data$Q35.D)) # Water Services
w4data$Q35.E <- as.numeric(recodeFivePos(w4data$Q35.E)) # Electricity Services
w4data$Q35.F <- as.numeric(recodeFivePos(w4data$Q35.F)) # Transportation Services
w4data$Q35.G <- as.numeric(recodeFivePos(w4data$Q35.G)) # Security Services
w4data$Q41 <- as.numeric(recodeFourPos(w4data$Q41))
w4data$Q42.GRP <- as.numeric(recodeFourPos(w4data$Q42.GRP)) # GRP
w4data$Q42.AFP <- as.numeric(recodeFourPos(w4data$Q42.AFP)) # AFP
w4data$Q42.PNP <- as.numeric(recodeFourPos(w4data$Q42.PNP)) # PNP
w4data$Q57.A <- as.numeric(recodeFourPos(w4data$Q57.A)) # President and his Cabinet
w4data$Q57.C <- as.numeric(recodeFourPos(w4data$Q57.C)) # Congress
w4data$Q57.D <- as.numeric(recodeFourPos(w4data$Q57.D)) # Legal System/Courts
w4data$Q57.E <- as.numeric(recodeFourPos(w4data$Q57.E)) # Provincial Government
w4data$Q57.F <- as.numeric(recodeFourPos(w4data$Q57.F)) # City/Town Government
w4data$Q57.G <- as.numeric(recodeFourPos(w4data$Q57.G)) # Barangay
w4data$Q57.H <- as.numeric(recodeFourPos(w4data$Q57.H)) # Domestic Media
w4data$Q58.A <- as.numeric(recodeFourPos(w4data$Q58.A)) # Civil Service / Government Workers
w4data$Q58.B <- as.numeric(recodeFourPos(w4data$Q58.B)) # Religious leaders
w4data$Q58.C <- as.numeric(recodeFourPos(w4data$Q58.C)) # NGOs
w4data$Q61 <- as.numeric(recodeThreeNeg(w4data$Q61))
w4data$Q62.A <- as.numeric(recodeTenPos(w4data$Q62.A)) # National Government
w4data$Q62.B <- as.numeric(recodeTenPos(w4data$Q62.B)) # Provincial Government
w4data$Q62.C <- as.numeric(recodeTenPos(w4data$Q62.C)) # City/Town Government
w4data$Q62.D <- as.numeric(recodeTenPos(w4data$Q62.D)) # Courts
w4data$Q62.E <- as.numeric(recodeTenPos(w4data$Q62.E)) # President
w4data$Q62.F <- as.numeric(recodeTenPos(w4data$Q62.F)) # President's Family
w4data$Q62.G <- as.numeric(recodeTenPos(w4data$Q62.G)) # Senate
w4data$Q62.H <- as.numeric(recodeTenPos(w4data$Q62.H)) # House of Representatives/Congress
w4data$Q62.I <- as.numeric(recodeTenPos(w4data$Q62.I)) # AFP
w4data$Q62.J <- as.numeric(recodeTenPos(w4data$Q62.J)) # PNP
w4data$Q62.K <- as.numeric(recodeTenPos(w4data$Q62.K)) # Big business owners
w4data$Q65 <- as.numeric(recodeFourPos(w4data$Q65))
w4data$Q66 <- as.numeric(recodeFourPos(w4data$Q66))
w4data$Q68.NPA <- as.numeric(recodeFiveNeg(w4data$Q68.NPA)) # NPA
w4data$Q68.MILF <- as.numeric(recodeFiveNeg(w4data$Q68.MILF)) # MILF
w4data$Q68.BIFF <- as.numeric(recodeFiveNeg(w4data$Q68.BIFF)) # BIFF (727 Not Aware)
w4data$Q68.ASG <- as.numeric(recodeFiveNeg(w4data$Q68.ASG)) # Abu Sayyaf
w4data$Q68.ALQAIDA <- as.numeric(recodeFiveNeg(w4data$Q68.ALQAIDA)) # Al Qaida (1278 Not Aware)
w4data$Q68.JI <- as.numeric(recodeFiveNeg(w4data$Q68.JI)) # Jemaah Islamiya (914 Not Aware)
w4data$Q68.MNLF <- as.numeric(recodeFiveNeg(w4data$Q68.MNLF)) # MNLF
w4data$Q77.NPA <- as.numeric(recodeThreeNeg(w4data$Q77.NPA)) # NPA
w4data$Q77.MILF <- as.numeric(recodeThreeNeg(w4data$Q77.MILF)) # MILF
w4data$Q77.BIFF <- as.numeric(recodeThreeNeg(w4data$Q77.BIFF)) # BIFF (799 Not Aware)
w4data$Q77.ASG <- as.numeric(recodeThreeNeg(w4data$Q77.ASG)) # Abu Sayyaf
w4data$Q77.ALQAIDA <- as.numeric(recodeThreeNeg(w4data$Q77.ALQAIDA)) # Al Qaida (1362 Not Aware)
w4data$Q77.JI <- as.numeric(recodeThreeNeg(w4data$Q77.JI)) # Jemaah Islamiya (947 Not Aware)
w4data$Q77.MNLF <- as.numeric(recodeThreeNeg(w4data$Q77.MNLF)) # MNLF
w4data$Q80.MARINES <- as.numeric(recodeFourPos(w4data$Q80.MARINES)) # Philippine Marines
w4data$Q80.CAFGU <- as.numeric(recodeFourPos(w4data$Q80.CAFGU)) # CAFGU
w4data$Q80.CVO <- as.numeric(recodeFourPos(w4data$Q80.CVO)) # CVO
```

```
w4data$Q80.BARANGAYTANOD <- as.numeric(recodeFourPos(w4data$Q80.BARANGAYTANOD)) #
Barangay Tanods
w4data$Q82 <- as.numeric(recodeFourNeg(w4data$Q82))
w4data$Location <- as.factor(recodeLoc(w4data$Location))
w4data$Gender <- as.factor(recodeGen(w4data$Gender))
w4data$Agegroup <- as.factor(recodeAge(w4data$Agegroup))
w4data$Religion <- as.factor(recodeRel(w4data$Religion))
w4data$Ecoclass <- as.factor(recodeClass(w4data$Ecoclass))
w4data$WAVE <- as.factor(w4data$WAVE)

names(w3data) <- c("Q1", "Q2", "Q6.B", "Q6.D","Q6.E", "Q6.H", "Q6.I", "Q6.Q", "Q6.R", "Q7.A", "Q7.B",
"Q7.C", "Q7.D","Q7.E", "Q7.F", "Q7.G", "Q7.H", "Q7.I", "Q7.J", "Q7.K", "Q7.L", "Q7.M", "Q7.N", "Q7.O",
"Q7.P", "Q7.Q", "Q7.R", "Q14.GRP", "Q14.AFP", "Q14.PNP", "Q14.CAFGU", "Q15.GRP", "Q15.AFP",
"Q15.PNP", "Q15.CAFGU", "Q16.GRP", "Q16.AFP", "Q16.PNP", "Q16.CAFGU", "Q17.A", "Q17.B", "Q17.C",
"Q17.D", "Q17.E", "Q17.F", "Q17.G", "Q27", "Q28.A", "Q28.B", "Q28.C", "Q39.A", "Q39.B", "Q39.C", "Q39.D",
"Q39.E", "Q39.F", "Q39.G", "Q40.A", "Q40.B", "Q40.C", "Q43", "Q44.A", "Q44.B", "Q44.C", "Q44.D", "Q44.E",
"Q44.F", "Q44.G", "Q44.H", "Q44.I", "Q44.J", "Q44.K", "Q54", "Q55.A", "Q55.B", "Q55.C", "Q55.D", "Q55.E",
"Q55.F", "Q55.G", "Q59.A", "Q59.B", "Q59.C", "Q59.D", "Q59.E", "Q59.F", "Q59.G", "Q62", "Q64.A", "Q64.B",
"Q64.C", "Q64.D", "Q71", "LOCATION", "GENDER" ,"AGEGROUP", "RELIGION", "CLASS", "WAVE")
names(w4data) <- names(w3data)

all.data <- rbind(w2data,w3data,w4data)

write.table(all.data,"C:/Users/tmdevean/Desktop/Philippines/All_Recode_Data.csv",sep=",",col.names=TRUE,row.
names=FALSE,quote=TRUE,na="NA")
```

APPENDIX B. R CODE FOR MISSING DATA IMPUTATION

```
## Hot Deck Imputation

library(StatMatch)

imputeHD <- function(Question,Dframe,Donor.Class,Match.vars){

  ## Split data into receiver and donors
  ## Receiver
  Data.rec <- Dframe[is.na(Dframe[,Question])==TRUE,] # creates new data set consisting of only the rows in
which Question is NA
  Data.rec <- subset(Data.rec,select=-get(Question)) # gets rid of only the Question column

  ## Donor
  Data.don <- Dframe[is.na(Dframe[,Question])==FALSE,] # creates a new data set consisting of only the rows in
which Question is not NA

  ## Search for donors
  imp.RAND <- RANDwNND.hotdeck(data.rec = Data.rec, data.don = Data.don, match.vars = Match.vars,
                       don.class = Donor.Class, dist.fun="Manhattan")

  ## Impute missing values
  Data.rec.imp <- create.fused(data.rec=Data.rec,data.don=Data.don,mtc.ids=imp.RAND$mtc.ids,z.vars=Question)

  ## Rebuild the imputed data.frame
  final <- rbind(Data.don, Data.rec.imp)
  return(final)

}

HD.loop <- function (Dframe, Donor.Class, Match.vars, Question) {
  for (q in Question) {
    if (sum(is.na(Dframe[,q])) > 0) {
      Dframe <- imputeHD(q, Dframe, Donor.Class, Match.vars)
    }
  }
  Dframe  # final recoded and hotdecked data
}

Match.vars <- c("GENDER", "AGEGROUP", "RELIGION", "CLASS", "WAVE") #Make up the donor "pool"
all.data$LOCATION <- as.factor(all.data$LOCATION) #Location must be a factor
Donor.Class <- c("LOCATION") #Location is the donor class
Dframe <- all.data

Question <- c("Q1", "Q2", "Q6.B", "Q6.D","Q6.E", "Q6.H", "Q6.I", "Q6.Q", "Q6.R", "Q7.A", "Q7.B", "Q7.C",
"Q7.D","Q7.E", "Q7.F", "Q7.G", "Q7.H", "Q7.I", "Q7.J", "Q7.K", "Q7.L", "Q7.M", "Q7.N", "Q7.O", "Q7.P",
"Q7.Q", "Q7.R", "Q14.GRP", "Q14.AFP", "Q14.PNP", "Q14.CAFGU", "Q15.GRP", "Q15.AFP", "Q15.PNP",
"Q15.CAFGU", "Q16.GRP", "Q16.AFP", "Q16.PNP", "Q16.CAFGU", "Q17.A", "Q17.B", "Q17.C", "Q17.D",
"Q17.E", "Q17.F", "Q17.G", "Q27", "Q28.A", "Q28.B", "Q28.C", "Q39.A", "Q39.B", "Q39.C", "Q39.D", "Q39.E",
"Q39.F", "Q39.G", "Q40.A", "Q40.B", "Q40.C", "Q43", "Q44.A", "Q44.B", "Q44.C", "Q44.D", "Q44.E", "Q44.F",
"Q44.G", "Q44.H", "Q44.I", "Q44.J", "Q44.K", "Q54", "Q55.A", "Q55.B", "Q55.C", "Q55.D", "Q55.E", "Q55.F",
```

```
"Q55.G", "Q59.A", "Q59.B", "Q59.C", "Q59.D", "Q59.E", "Q59.F", "Q59.G", "Q62", "Q64.A", "Q64.B", "Q64.C",
"Q64.D", "Q71", "LOCATION", "GENDER", "AGEGROUP", "RELIGION", "CLASS", "WAVE")

all.rec.imp.data <- HD.loop(Dframe, Donor.Class, Match.vars, Question)

write.table(all.rec.imp.data,"C:/Users/tmdevean/Desktop/Philippines/All_Rec_Imp_Data.csv",sep=",",col.names=T
RUE,row.names=FALSE,quote=TRUE,na="NA")

# Delete all variables except those we want to create factors with (taken from the Questions above)
final.data <- all.rec.imp.data[,-c(94:99)]

# Check to see if there are any missing values remaining
for (i in 1:ncol(final.data)) {
  check <- sum(is.na(final.data[,i]))
}
check

write.table(final.data,"C:/Users/tmdevean/Desktop/Philippines/Final_Data.csv",sep=",",col.names=TRUE,row.name
s=FALSE,quote=TRUE,na="NA")
```

APPENDIX C. R CODE FOR FACTOR ANALYSIS

```
## Script for conducting Factor Analysis on combined Waves 2-4 of the Philippine SPPPS data.

# First run parallel analysis to determine the correct number of factors.
# Function finds optimal number of factors, forms a matrix of the factor loadings as the output.
# Prints out the optimal number of factors used based off of eigenvalues.
# Prints out the factor matrix with loadings > 0.4 or < -0.4.
# Prints out the variable names by factor as well as the factor names.
# Prints the % of variance the factor will explain via eigenvalues.
# Modifies the loading matrix by deleting factors that are n/a.
# Calculates the matrix of factor scores.
# Scales the factor score matrix appropriately to values between -2 and 2.

final.data <- read.csv("C:/Users/tmdevean/Desktop/Philippines/Final_Data.csv")
allrecimp.data <- read.csv("C:/Users/tmdevean/Desktop/Philippines/All_Rec_Imp_Data.csv")

factorNames <- c("1. Government Corruption", "2. Trust in Insurgency", "3. Trust in/Performance of AFP", "4.
Threats to Peace", "5. Confidence in Institutions", "6. Trust in/Performance of PNP", "7. Satisfaction with Basic
Services", "8. Trust in/Performance of CAFGU", "9. Trust in/Performance of  GRP", "10. Approval of Family
Members Joining the Insurgency", "11. Awareness of Groups (Gov and Insurgent)", "12. Trust in Lesser Groups",
"13. Approval of Family Members Joing the Government/Military", "14. Safety Provided by Local Groups", "15.
None", "16. None", "17. None", "18. None", "19. None", "20. None", "21. None")

#### This produces the scree plot and determines the number of relevant factors based upon the covariance matrix.
library(pysch)

fa.parallel (final.data)

initial.factor.analysis <- function(data,num){

 ## Find the optimal number of factors for a field of data
 ev <- eigen(cor(final.data))
 if(num!=0) {
  num <- num
 }
 else {
  num <- length(ev$values[ev$values > 1]) # rule of thumb to use eigenvalues; default if no factors are given
 }

 ## Conduct factor analysis
 fact <- factanal(data,factors=num,rotation="varimax")

 ## Convert the factor loadings to a matrix and name the factors
 fa.mat <- numeric(0)
 for(i in 1:num){
  fake.fac.load <- fact$loadings[,i]
  fake.fac.load[fact$loadings[,i] < 0.4 & (fact$loadings[,i] > -0.4)] <- 0 # set to  < -0.4 or > 0.4
  fa.mat <- cbind(fa.mat, fake.fac.load) # builds a matrix of factors
 }
 colnames(fa.mat) <- c()
 rownames(fa.mat) <- c()
 rownames(fa.mat) <- c(colnames(final.data))
```

```
  colnames(fa.mat) <- colnames(fa.mat, do.NULL= FALSE, prefix = "Factor.")
  fa.mat # matrix with loadings > 0.4 or < -0.4

  ## Calculate the variance of each variable
  i.j.MatrixLoc <- which(fa.mat!=0, arr.ind=TRUE) # break down of varibles into appropriate factors

  z <- tapply (i.j.MatrixLoc[,1], i.j.MatrixLoc[,2],
           function (x) sum (ev$values[x]))/length(ev$values) # finds the proportional variance
  z <- as.matrix(z)
  dim(z) <- length(z) # z is number of relevant factors because of 0.4/-0.4 criteria
  rownames(z) <- rownames(z, do.NULL= FALSE, prefix = "Factor.") # gives the factor number to the row

  ## Print the Output

  cat("The number of factors (based off of eigenvalues or given) is: ", num, "\n", sep="",
     file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=FALSE)
  cat("\n","The number of relevent factors is: ",length(z),"\n", sep="",
     file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE)
  cat("\n","The variables per factor are: ", "\n","================================", sep="",
     file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE)
  x <- numeric(0)
  for(i in 1:ncol(fa.mat)){
   f <- rownames(fa.mat)[which(fa.mat[,i]!=0)]
   x <- fa.mat[which(fa.mat[,i]!=0),i]
   x <- as.matrix(x)
   rownames(f) <- c(colnames(fa.mat[,i]))
   colnames(x) <- c(colnames(fa.mat[,i]))
   cat("\n","Factor",i,"= ", sep=" ",
      file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE)
   cat(round(x,4), sep=", ",
      file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE)
   cat("\n","Factor",i,"= ", sep=" ",
      file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE)
   cat(f, sep=", ",
      file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE)
   cat("\n","----------------------------------------------------------------","\n",sep="",
      file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE)
  }
  cat("\n","----------------------------------------------------------------","\n","\n",
     "The variance impact of each factor is in % : ", "\n",
     "================================================","\n", sep="",
     file="C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE)
  write.table(round(z,4)*100,"C:/Users/tmdevean/Desktop/Philippines/FactorOutput.txt", append=TRUE,
           sep="= ", col.names=FALSE, row.names=TRUE, quote=FALSE, na="NA")
}

initial.factor.analysis(final.data,21)

factor.analysis <- function(data,num,name){

  fact <- factanal(data,factors=num,rotation="varimax")

  ## Convert the factor loadings to a matrix and name the factors
  fa.mat <- numeric(0)
  for(i in 1:num){
```

```
    fake.fac.load <- fact$loadings[,i]
    fake.fac.load[fact$loadings[,i] < 0.4 & (fact$loadings[,i] > -0.4)] <- 0 # set to 0. < -0.4 or > 0.4
    fa.mat <- cbind(fa.mat, fake.fac.load) # builds a matrix of factors
  }
  colnames(fa.mat) <- c()
  rownames(fa.mat) <- c()
  rownames(fa.mat) <- c(colnames(data))
  colnames(fa.mat) <- colnames(fa.mat, do.NULL= FALSE, prefix = "Factor.")
  fa.mat # matrix with loadings > 0.4 or < -0.4

  if (is.na(name)==FALSE){
    colnames(fa.mat)<- c(name)
    return(fa.mat)
  }
  else{
    return(fa.mat)
  }
}
SPPPS.factors <- factor.analysis(final.data,21,factorNames) # "SPPPS.factors" is the matrix of loadings

## Modify factors & create matrix of factor scores

SPPPS.factors <- SPPPS.factors[,-c(15,16,17,18,19,20,21)] # delete factors 15, 16, 17, 18, 19, 20, 21
help <- data.frame(rownames(SPPPS.factors), SPPPS.factors)
write.table(help,"C:/Users/tmdevean/Desktop/Philippines/FactorOutput.csv", sep=",",
col.names=TRUE,row.names=FALSE,quote=TRUE,na="NA")
final.data <- as.matrix(final.data) # convert data to matrix IOT multiply
factor.scores <- final.data%*%solve(cor(final.data))
factor.scores <- data.frame(factor.scores%*%SPPPS.factors) # gives the "factor scores" as a data frame

## Scale factor scores by dividing by factor loading sums to get scores between -2 and 2 ######

nr.qs <- apply(SPPPS.factors, 2, function(x) sum(as.numeric(x != 0)))
for (i in (1:ncol(factor.scores))) {
  factor.scores[,i] <- factor.scores[,i]/nr.qs[i]
}
names(factor.scores) <- c("X1","X2","X3","X4","X5","X6","X7","X8","X9","X10","X11","X12","X13","X14")
write.table(factor.scores,"C:/Users/tmdevean/Desktop/Philippines/FactorScores.csv", sep=",",
col.names=TRUE,row.names=FALSE,quote=TRUE,na="NA")
allrecimp.data$LOCATION <- as.factor(allrecimp.data$LOCATION)
allrecimp.data$WAVE <- as.factor(allrecimp.data$WAVE)
allrecimp.data$GENDER <- as.factor(allrecimp.data$GENDER)
allrecimp.data$RELIGION <- as.factor(allrecimp.data$RELIGION)
allrecimp.data$CLASS <- as.factor(allrecimp.data$CLASS)
factor.scores.spatemp <-
cbind(factor.scores,allrecimp.data$LOCATION,allrecimp.data$WAVE,allrecimp.data$GENDER,
allrecimp.data$RELIGION,allrecimp.data$CLASS)
colnames(factor.scores.spatemp)[15] <- c("LOCATION")
colnames(factor.scores.spatemp)[16] <- c("WAVE")
colnames(factor.scores.spatemp)[17] <- c("GENDER")
colnames(factor.scores.spatemp)[18] <- c("RELIGION")
colnames(factor.scores.spatemp)[19] <- c("CLASS")

write.table(factor.scores.spatemp,"C:/Users/tmdevean/Desktop/Philippines/FactorScoresSpaTemp.csv", sep=",",
col.names=TRUE,row.names=FALSE,quote=TRUE,na="NA")
```

APPENDIX D. MICRO LEVEL FACTOR ANALYSIS RESULTS

Final Cotabato Factors

F1 Name: **Performance of the GRP, AFP, and PNP**

0.4881	0.4403	0.4959	0.4264	0.4168	0.4313	0.5837	0.5574	0.567
Q14.GRP	Q14.AFP	Q14.PNP	Q15.PNP	Q16.GRP	Q16.PNP	Q17.GRP	Q17.AFP	Q17.PNP

0.6228	0.6542	0.6992	0.6895	0.7014	0.6216	0.6782	0.5872	0.6461
Q18.GRP	Q18.AFP	Q18.PNP	Q19.AFP	Q19.PNP	Q20.AFP	Q20.PNP	Q21.AFP	Q21.PNP

0.6115	0.7007	0.6777	0.7046	0.6543	0.706	0.6531	0.6696	0.7264
Q22.GRP	Q22.PNP	Q23.GRP	Q23.AFP	Q24.AFP	Q24.PNP	Q25.GRP	Q26.GRP	Q26.AFP

0.6956	0.7107	0.6499	0.6184	0.6184	0.6856	0.728	0.7296	0.7157
Q27.GRP	Q27.PNP	Q28.GRP	Q28.AFP	Q28.PNP	Q29.GRP	Q29.AFP	Q29.PNP	Q30.GRP

0.7006	0.6865	0.6859	0.7129	0.7107	0.7432	0.699	0.758	0.7172
Q30.AFP	Q30.PNP	Q31.GRP	Q32.GRP	Q32.AFP	Q33.GRP	Q33.PNP	Q34.GRP	Q34.AFP

F2 Name: **Government Corruption**

0.6646	0.7542	0.7291	0.6557	0.4705	0.4129	0.6861	0.7259	0.6301
Q62.A	Q62.B	Q62.C	Q62.D	Q62.E	Q62.F	Q62.G	Q62.H	Q62.I

0.6403
Q62.J

F3 Name: **Confidence in Government Institutions**

0.595	0.7748	0.7821	0.6271	0.559	0.5511	0.4021	0.4634	0.4729
Q57.A	Q57.B	Q57.C	Q57.D	Q57.E	Q57.F	Q57.G	Q57.H	Q58.A

0.4262
Q58.C

F4 Name: **Threats to Peace**

0.6404	0.7376	0.7369	0.7308	0.7187	0.7944

Q68.NPA	Q68.MILF	Q68.BIFF	Q68.ASG	Q68.JI	Q68.MNLF

F5 Name: **Approval of Family Members Joining the Insurgency**

0.6711	0.5918	0.6746	0.4409	0.689	0.6304
Q77.NPA	Q77.MILF	Q77.BIFF	Q77.ASG	Q77.JI	Q77.MNLF

F6 Name: **Satsifaction with Basic Services**

0.541	0.5642	0.5285	0.6419	0.6594	0.451	0.5059
Q35A	Q35B	Q35C	Q35D	Q35E	Q35F	Q35G

F7 Name: **Trust in Insurgency**

0.5889	0.4416	0.8177	0.778
Q7.BIFF	Q7.JI	Q7.MILF	Q7.MNLF

F8 Name: **Trust in Performance of the CAFGU**

0.466	0.6833	0.7322	0.7439
Q7.CAFGU	Q14.CAFGU	Q15.CAFGU	Q16.CAFGU

F9 Name: **Trust in the AFP**

0.4343	0.6401	0.6524	0.56	0.4811
Q7.AFP	Q7.PAF	Q7.PHILMARINES	Q7.PNPSAF	Q7.USFORCES

F10 Name: **General Awareness**

0.5075	0.4756	0.4121	0.5515	0.4054	0.4589
Q6.ALQAIDA	Q6.JI	Q6.MNLF	Q6.PAF	Q6.PNPSAF	Q6.USFORCES

F11 Name: **Trust in the GRP**

0.4717	0.4281	0.4883	0.4714
Q7.GRP	Q14.GRP	Q15.GRP	Q16.GRP

F12 Name: **Approval of Family Members Joining the Government/Military**

0.5589	0.7712	0.7694
Q42.GRP	Q42.AFP	Q42.PNP

F13 Name: **Safety Provided by Lesser Groups**

0.5535	0.8163	0.6096
Q80.CAFGU	Q80.CVO	Q80.BARANGAYTANOD

Final Isabela Factors

F1 Name: **Trust in/Performance of the PNP**

0.7864	0.4044	0.7749	0.7401	0.7819	0.8004	0.7527	0.7508	0.7386
Q7.PNP	Q7.PNPSAF	Q14.PNP	Q15.PNP	Q16.PNP	Q17.PNP	Q18.PNP	Q19.PNP	Q20.PNP

0.7549	0.7354	0.7488	0.7562	0.7572	0.7674	0.7397	0.7387	0.4665
Q21.PNP	Q22.PNP	Q24.PNP	Q27.PNP	Q28.PNP	Q29.PNP	Q30.PNP	Q33.PNP	Q42.PNP

0.4899	0.6787
Q62.J	Q67

F2 Name: **Trust in/Performance of the GRP**

0.6421	0.7082	0.705	0.7496	0.7206	0.696	0.6878	0.6843	0.7198
Q7.GRP	Q14.GRP	Q15.GRP	Q16.GRP	Q17.GRP	Q18.GRP	Q22.GRP	Q23.GRP	Q25.GRP

0.7286	0.6786	0.7309	0.7207	0.6913	0.7063	0.6699	0.6694	0.6636
Q26.GRP	Q27.GRP	Q28.GRP	Q29.GRP	Q30.GRP	Q31.GRP	Q32.GRP	Q33.GRP	Q34.GRP

0.4122
Q42.GRP

F3 Name: **Trust in/Performance of the AFP**

0.6652	0.7307	0.7244	0.7092	0.7245	0.6854	0.6116	0.6913	0.6755
Q7.AFP	Q14.AFP	Q15.AFP	Q16.AFP	Q17.AFP	Q18.AFP	Q19.AFP	Q20.AFP	Q21.AFP

0.6513	0.6714	0.7024	0.7363	0.6761	0.6915	0.6996	0.6357	0.5979
Q23.AFP	Q24.AFP	Q26.AFP	Q28.AFP	Q29.AFP	Q30.AFP	Q32.AFP	Q34.AFP	Q66

F4 Name: **Government Corruption**

0.7033	0.799	0.8135	0.6612	0.5985	0.4647	0.732	0.7822	0.7032
Q62.A	Q62.B	Q62.C	Q62.D	Q62.E	Q62.F	Q62.G	Q62.H	Q62.I

0.6549
Q62.J

F5 Name: **Confidence in Government Institutions**

0.5824	0.714	0.7145	0.4952	0.5226	0.5812	0.4049	0.4766
Q57.A	Q57.B	Q57.C	Q57.D	Q57.E	Q57.F	Q57.G	Q58.A

F6 Name: **Trust in Insurgency**

0.6791	0.8999	0.8763	0.7006
Q7.ASG	Q7.MILF	Q7.MNLF	Q7.NPA

F7 Name: **Overall Awareness**

0.6058	0.7035	0.6715	0.407
Q6.NPA	Q6.PAF	Q6.PNPSAF	Q6.USFORCES

F8 Name **Satsifaction with Basic Services**

0.5485	0.611	0.5967	0.588	0.474	0.5281
Q35A	Q35B	Q35C	Q35D	Q35E	Q35F

F9 Name: **Trust in/Performance of the CAFGU**

0.5197	0.6839	0.6868	0.6558
Q7.CAFGU	Q14.CAFGU	Q15.CAFGU	Q16.CAFGU

F10 Name: **Threats to Peace**

0.8396	0.7143	0.7546
Q68.MILF	Q68.ASG	Q68.MNLF

F11 Name: **Approval of Family Members Joining the Insurgency**

0.4067	0.841	0.7969	0.6725
Q77.NPA	Q77.MILF	Q77.ASG	Q77.MNLF

F12 Name: **Confidence in Religious Leaders/NGO**

0.4533	0.5019	0.547	0.4676
Q57.G	Q58.B	Q58.C	Q80.BARANGAYTANOD

F13 Name: **Awareness of AlQaida and its Affiliates**

0.6395	0.5859	0.7243
Q6.ALQAIDA	Q6.BIFF	Q6.JI

F14 Name: **Approval of Family Members Joining the Government/Military**

0.4815	0.7511	0.699
Q42.GRP	Q42.AFP	Q42.PNP

Final Marawi Factors

F1 Name: **Trust in/Performance of the AFP**

0.7813	0.8335	0.8319	0.8262	0.84	0.8107	0.7811	0.7599	0.7823
Q7.AFP	Q14.AFP	Q15.AFP	Q16.AFP	Q17.AFP	Q18.AFP	Q19.AFP	Q20.AFP	Q21.AFP

0.7604	0.7754	0.7752	0.8385	0.7787	0.7571	0.7524	0.7672	0.5667
Q23.AFP	Q24.AFP	Q26.AFP	Q28.AFP	Q29.AFP	Q30.AFP	Q32.AFP	Q34.AFP	Q42.AFP

0.6744	0.6922
Q62.I	Q66

F2 Name: **Trust in/Performance of the PNP**

0.7767	0.8056	0.8023	0.8015	0.7766	0.7046	0.7371	0.7185	0.7032
Q7.PNP	Q14.PNP	Q15.PNP	Q16.PNP	Q17.PNP	Q18.PNP	Q19.PNP	Q20.PNP	Q21.PNP

0.734	0.7424	0.7747	0.7901	0.7113	0.6892	0.7142	0.5007	0.577
Q22.PNP	Q24.PNP	Q27.PNP	Q28.PNP	Q29.PNP	Q30.PNP	Q33.PNP	Q42.PNP	Q62.J

0.5877
Q67

F3 Name: **Trust in/Performance of the GRP**

0.6887	0.7395	0.71	0.7164	0.7051	0.5657	0.7175	0.7127	0.6837
Q7.GRP	Q14.GRP	Q15.GRP	Q16.GRP	Q17.GRP	Q18.GRP	Q22.GRP	Q23.GRP	Q25.GRP

0.6919	0.6993	0.6994	0.7038	0.6885	0.6728	0.66	0.6891	0.6972
Q26.GRP	Q27.GRP	Q28.GRP	Q29.GRP	Q30.GRP	Q31.GRP	Q32.GRP	Q33.GRP	Q34.GRP

0.4284
Q57.A

F4 Name: **Government Corruption**

0.7574	0.7609	0.7531	0.7136	0.77	0.7186	0.8167	0.8057	0.4981
Q62.A	Q62.B	Q62.C	Q62.D	Q62.E	Q62.F	Q62.G	Q62.H	Q62.I

0.6055
Q62.J

F5 Name: **Satisfaction with Basic Services**

0.6395	0.5766	0.4763	0.599	0.6533	0.6623	0.6758	0.4733	0.4473
Q35A	Q35B	Q35C	Q35D	Q35E	Q35F	Q35G	Q57.G	Q65

0.4141	0.5337
Q80.CVO	Q80.BARANGAYTANOD

F6 Name: **Overall Awareness**

0.4338	0.4639	0.462	0.4074	0.4499	0.5219	0.6613	0.4985
Q6.ASG	Q6.ALQAIDA	Q6.BIFF	Q6.CAFGU	Q6.MNLF	Q6.NPA	Q6.PAF	Q6.PHILMARINES

0.6253	0.4079
Q6.PNPSAF	Q6.USFORCES

F7 Name: **Trust in/Performance of the CAFGU**

0.6565	0.7577	0.7883	0.7576	0.5264
Q7.CAFGU	Q14.CAFGU	Q15.CAFGU	Q16.CAFGU	Q80.CAFGU

F8 Name: **Confidence in Government Institutions**

0.4352	0.7803	0.7796	0.4888
Q57.A	Q57.B	Q57.C	Q57.D

F9 Name: **Trust in Insurgency/Approval of Family Members Joining the Insurgency**

0.5469	0.5858	0.4308	0.5965	0.5638	0.4083
Q7.BIFF	Q7.MILF	Q7.MNLF	Q77.MILF	Q77.BIFF	Q77.MNLF

F10 Name: **Threats to Peace**

0.5796	0.5201	0.4425	0.6481	0.6005
Q68.NPA	Q68.MILF	Q68.BIFF	Q68.ASG	Q68.MNLF

F11 Name: **Trust in Lesser Groups**

0.5468	0.677	0.4161
Q7.PAF	Q7.PHILMARINES	Q80.MARINES

F12 Name: **Approval of Family Members Joining the Government/Military**

0.5071	0.5015
Q42.GRP	Q42.PNP

Final Southern Basilan Factors

F1 Name: **Trust in/Performance of the GRP**

0.4723	0.6633	0.6212	0.5864	0.6518	0.6779	0.7129	0.7094	0.6781
Q7.GRP	Q14.GRP	Q15.GRP	Q16.GRP	Q17.GRP	Q18.GRP	Q22.GRP	Q23.GRP	Q25.GRP

0.7373	0.7298	0.6853	0.7432	0.7086	0.6842	0.6731	0.7199	0.7148
Q26.GRP	Q27.GRP	Q28.GRP	Q29.GRP	Q30.GRP	Q31.GRP	Q32.GRP	Q33.GRP	Q34.GRP

F2 Name: **Trust in/Performance of the PNP**

0.7707	0.7597	0.7383	0.7549	0.7021	0.6456	0.6904	0.7022	0.6954
Q7.PNP	Q14.PNP	Q15.PNP	Q16.PNP	Q17.PNP	Q18.PNP	Q19.PNP	Q20.PNP	Q21.PNP

0.6985	0.6966	0.7312	0.7237	0.6532	0.684	0.7096	0.6007
Q22.PNP	Q24.PNP	Q27.PNP	Q28.PNP	Q29.PNP	Q30.PNP	Q33.PNP	Q67

F3 Name: **Trust in/Performance of the AFP**

0.7119	0.7379	0.735	0.703	0.7376	0.6701	0.674	0.7341	0.7096
Q7.AFP	Q14.AFP	Q15.AFP	Q16.AFP	Q17.AFP	Q18.AFP	Q19.AFP	Q20.AFP	Q21.AFP

0.6674	0.6546	0.6484	0.7172	0.6707	0.6445	0.6501	0.6598	0.4146
Q23.AFP	Q24.AFP	Q26.AFP	Q28.AFP	Q29.AFP	Q30.AFP	Q32.AFP	Q34.AFP	Q66

F4 Name: **Government Corruption**

0.7764	0.7903	0.812	0.7084	0.7298	0.686	0.7761	0.7589	0.6806
Q62.A	Q62.B	Q62.C	Q62.D	Q62.E	Q62.F	Q62.G	Q62.H	Q62.I

0.6914
Q62.J

F5 Name: **Satisfaction with Basic Services**

0.6398	0.657	0.6489	0.4178	0.5136	0.5337

Q35A	Q35B	Q35C	Q35D	Q35E	Q35F

F6 Name: **Confidence in Government Institutions**

0.5838	0.5762	0.5915	0.4857	0.4523	0.4458
Q57.B	Q57.C	Q57.D	Q57.H	Q58.A	Q58.C

F7 Name: **Safety Provided by Lesser Groups**

0.4404	0.5673	0.5129
Q80.CAFGU	Q80.CVO	Q80.BARANGAYTANOD

F8 Name: **Trust in/Performance of the CAFGU**

0.5887	0.6734	0.6745	0.6325
Q7.CAFGU	Q14.CAFGU	Q15.CAFGU	Q16.CAFGU

F9 Name: **Trust in Insurgency**

0.491	0.8931	0.853
Q7.ASG	Q7.MILF	Q7.MNLF

F10 Name: **Threats to Peace**

0.4593	0.8006	0.6045	0.4718
Q65	Q68.MILF	Q68.ASG	Q68.MNLF

F11 Name: **Approval of Family Members Joining the Insurgency**

0.8608	0.7498
Q77.MILF	Q77.MNLF

F12 Name: **Awareness of AlQaida and its Affiliates**

0.6242	0.6075
Q6.BIFF	Q6.JI

F13 Name: **Approval of Family Members Joining the Government/Military**

0.4928	0.7119	0.6986
Q42.GRP	Q42.AFP	Q42.PNP

F14 Name: **Fairness of the Courts**

0.5777	0.5457
Q87	Q88

Final Sulu Factors

F1 Name: **Trust in/Performance of the GRP**

0.4229	0.4866	0.4431	0.4662	0.4773	0.7533	0.4991	0.4297	0.6378
Q7.GRP	Q14.GRP	Q15.GRP	Q16.GRP	Q17.GRP	Q18.GRP	Q18.PNP	Q19.PNP	Q22.GRP

0.4734	0.6804	0.4702	0.4479	0.6393	0.6549	0.4713	0.7067	0.5216
Q22.PNP	Q23.GRP	Q23.AFP	Q24.PNP	Q25.GRP	Q26.GRP	Q26.AFP	Q27.GRP	Q27.PNP

0.5463	0.7336	0.4598	0.605	0.4022	0.4368	0.6556	0.6475	0.6603
Q28.GRP	Q29.GRP	Q29.PNP	Q30.GRP	Q30.AFP	Q30.PNP	Q31.GRP	Q32.GRP	Q33.GRP

0.437	0.6819	0.522	0.401
Q33.PNP	Q34.GRP	Q34.AFP	Q77.MNLF

F2 Name: **Trust in/Performance of the AFP**

0.6403	0.4417	0.6224	0.6379	0.6404	0.6912	0.5863	0.5296
Q7.AFP	Q7.PHILMARINES	Q14.AFP	Q15.AFP	Q16.AFP	Q17.AFP	Q18.AFP	Q19.AFP

0.5826	0.5729	0.4547	0.561	0.4986	0.6537	0.5607	0.4932	0.5397
Q20.AFP	Q21.AFP	Q23.AFP	Q24.AFP	Q26.AFP	Q28.AFP	Q29.AFP	Q30.AFP	Q32.AFP

0.5251
Q66

F3 Name: **Trust in/Performance of the PNP**

0.6259	0.6237	0.6413	0.6151	0.5782	0.5463	0.5241	0.5395	0.4951
Q7.PNP	Q14.PNP	Q15.PNP	Q16.PNP	Q17.PNP	Q18.PNP	Q19.PNP	Q20.PNP	Q21.PNP

0.4932	0.502	0.5216	0.5478	0.5389	0.5402	0.5222	0.4808
Q22.PNP	Q24.PNP	Q27.PNP	Q28.PNP	Q29.PNP	Q30.PNP	Q33.PNP	Q67

F4 Name: **Government Corruption**

0.7381	0.784	0.7916	0.5878	0.7189	0.6545	0.7066	0.6515	0.5878
Q62.A	Q62.B	Q62.C	Q62.D	Q62.E	Q62.F	Q62.G	Q62.H	Q62.I

0.6307
Q62.J

F5 Name: **Confidence in Government Institutions**

0.5132	0.4078	0.6031	0.6218	0.5923	0.4637	0.4696
Q7.USFORCES	Q57.C	Q57.D	Q57.E	Q57.F	Q57.G	Q57.H

F6 Name: **Trust in/Performance of the CAFGU**

0.5762	0.7316	0.7476	0.7258
Q7.CAFGU	Q14.CAFGU	Q15.CAFGU	Q16.CAFGU

F7 Name: **Satisfaction with Basic Services**

0.6571	0.6305	0.5628	0.5769	0.4892	0.46
Q35A	Q35B	Q35C	Q35D	Q35E	Q35G

F8 Name: **Trust in Insurgency**

0.5732	0.7515	0.6247
Q7.ASG	Q7.MILF	Q7.MNLF

F9 Name: **Awareness of AlQaida and its Affiliates**

0.5637	0.5714	0.6616	0.4579
Q6.ALQAIDA	Q6.BIFF	Q6.JI	Q6.NPA

F10 Name: **Approval of Family Members Joining the Government/Military**

0.533	0.6214	0.7602
Q42.GRP	Q42.AFP	Q42.PNP

F11 Name: **Safety Provided by Lesser Groups**

0.4691	0.4997	0.5135
Q80.CAFGU	Q80.CVO	Q80.BARANGAYTANOD

F12 Name: **Threats to Peace**

0.6439	0.4239	0.5892
Q68.MILF	Q68.ASG	Q68.MNLF

Final Zamboanga Factors

F1 Name: **Trust in/Performance of the PNP**

0.7335	0.7609	0.7527	0.742	0.7358	0.7164	0.7138	0.6755	0.6885
Q7.PNP	Q14.PNP	Q15.PNP	Q16.PNP	Q17.PNP	Q18.PNP	Q19.PNP	Q20.PNP	Q21.PNP

0.7115	0.688	0.7281	0.7146	0.6989	0.6248	0.6471	0.4447	0.5803
Q22.PNP	Q24.PNP	Q27.PNP	Q28.PNP	Q29.PNP	Q30.PNP	Q33.PNP	Q62.J	Q67

F2 Name: **Trust in/Performance of the GRP**

0.5856	0.6537	0.6435	0.631	0.6701	0.6577	0.6671	0.6793	0.6287
Q7.GRP	Q14.GRP	Q15.GRP	Q16.GRP	Q17.GRP	Q18.GRP	Q22.GRP	Q23.GRP	Q25.GRP

0.6327	0.6275	0.7312	0.7139	0.6891	0.688	0.6524	0.6541	0.6893
Q26.GRP	Q27.GRP	Q28.GRP	Q29.GRP	Q30.GRP	Q31.GRP	Q32.GRP	Q33.GRP	Q34.GRP

F3 Name: **Trust in/Performance of the AFP**

0.5809	0.6707	0.6436	0.6844	0.6953	0.6757	0.6607	0.6603	0.6453
Q7.AFP	Q14.AFP	Q15.AFP	Q16.AFP	Q17.AFP	Q18.AFP	Q19.AFP	Q20.AFP	Q21.AFP

0.5991	0.6533	0.6492	0.6928	0.6355	0.5309	0.6203	0.5188	0.4713
Q23.AFP	Q24.AFP	Q26.AFP	Q28.AFP	Q29.AFP	Q30.AFP	Q32.AFP	Q34.AFP	Q66

F4 Name: **Government Corruption**

0.7285	0.7201	0.7787	0.6175	0.6276	0.5163	0.7475	0.7377	0.6911
Q62.A	Q62.B	Q62.C	Q62.D	Q62.E	Q62.F	Q62.G	Q62.H	Q62.I

0.6348
Q62.J

F5 Name: **Confidence in Government Institutions**

0.5024	0.6364	0.6544	0.5748	0.4103	0.507	0.5025
Q57.A	Q57.B	Q57.C	Q57.D	Q57.E	Q57.F	Q57.H

F6 Name: **Trust in/Performance of the CAFGU**

0.6511	0.7124	0.7909	0.7439	0.4158
Q7.CAFGU	Q14.CAFGU	Q15.CAFGU	Q16.CAFGU	Q80.CAFGU

F7 Name: **Trust in Insurgency**

0.6917	0.8771	0.8583	0.6076
Q7.ASG	Q7.MILF	Q7.MNLF	Q7.NPA

F8 Name: **Satisfaction with Basic Services**

0.4913	0.5583	0.6233	0.5713	0.5477	0.5307	0.4029
Q35A	Q35B	Q35C	Q35D	Q35E	Q35F	Q35G

F9 Name: **Threats to Peace**

0.5205	0.8328	0.7889	0.7622
Q68.NPA	Q68.MILF	Q68.ASG	Q68.MNLF

F10 Name: **Approval of Family Members Joining the Insurgency**

0.5961	0.8282	0.6109	0.6222
Q77.NPA	Q77.MILF	Q77.ASG	Q77.MNLF

F11 Name: **Safety Provided by Lesser Groups**

0.4769	0.4913	0.5148
Q80.CAFGU	Q80.CVO	Q80.BARANGAYTANOD

F12 Name: **Awareness of AlQaida and its Affiliates**

0.6016	0.5381	0.661
Q6.ALQAIDA	Q6.BIFF	Q6.JI

F13 Name: **Trust in Lesser Groups**

0.5144	0.5067	0.4016	0.5106
Q7.PAF	Q7.PHILMARINES	Q7.PNP	Q7.PNPSAF

F14 Name: **Approval of Family Members Joining the Government/Military**

0.5545	0.7758	0.7244
Q42.GRP	Q42.AFP	Q42.PNP

F15 Name: **Fairness of the Courts**

0.8497	0.626
Q87	Q88

APPENDIX E. MACRO LEVEL FACTOR ANALYSIS RESULTS

Factor Name	F	Questions										
Government Corruption	1	Q44.A	Q44.B	Q44.C	Q44.D	Q44.E	Q44.F	Q44.G	Q44.H	Q44.I	Q44.J	Q44.K
Trust in Insurgency	2	Q7.A	Q7.B	Q7.E	Q7.I	Q7.J	Q7.K	Q7.L				
Trust in/Performance of AFP	3	Q7.C	Q14.AFP	Q15.AFP	Q16.AFP	Q44.I	Q62					
Threats to Peace	4	Q55.A	Q55.B	Q55.C	Q55.D	Q55.E	Q55.F	Q55.G				
Confidence in Institutions	5	Q39.A	Q39.B	Q39.C	Q39.D	Q39.E	Q39.F	Q39.G	Q40.A			
Trust in/Performance of PNP	6	Q7.O	Q14.PNP	Q15.PNP	Q16.PNP							
Satisfaction with Basic Services	7	Q17.A	Q17.B	Q17.C	Q17.D	Q17.E	Q17.F	Q17.G				
Trust in/Performance of CAFGU	8	Q7.F	Q14.CAFGU	Q15.CAFGU	Q16.CAFGU							
Trust in/Performance of GRP	9	Q7.G	Q14.GRP	Q15.GRP	Q16.GRP							
Approval of Family Members Joining Ins	10	Q59.A	Q59.B	Q59.C	Q59.D	Q59.E	Q59.F	Q59.G				
Awareness of Groups (Gov & Insurgent)	11	Q6.B	Q6.D	Q6.E	Q6.H	Q6.I	Q6.Q					
Trust in Lesser Groups	12	Q7.M	Q7.N	Q7.P	Q7.Q	Q7.R						
Approval of Family Members Joining Gov/Mil	13	Q28.A	Q28.B	Q28.C								
Safety Provided by Local Groups	14	Q64.B	Q64.C	Q64.D								

APPENDIX F. R CODE FOR REGRESSION MODELS & PLOTS

This appendix includes the R code for building the regression models, as well as the influence and key driver plots for the macro level analysis.

```
# Read in data set and recode categorical variables
combined.data <-
read.csv("C:/Users/tmdevean/Desktop/Philippines/FactorScoresSpaTemp.csv",header=TRUE,sep=",",stringsAsFact
ors=FALSE)
recodeClass2 <- function(x) {
  recode(x,
        '"ABC" = "High-class";
        "D1" = "High-class";
        "D2" = "Low-class";
        "E" = "Low-class"; ',
        as.factor.result = TRUE)
}
recodeRel2 <- function(x){
  recode(x,
        '"Islam" = "Islam";
        "Roman Catholic" = "Non-Islam";
        "Other" = "Non-Islam"; ',
        as.factor.result = TRUE)
}
combined.data$RELIGION <- as.factor(recodeRel2(combined.data$RELIGION))
combined.data$CLASS <- as.factor(recodeClass2(combined.data$CLASS))

# Subset
bas <- subset(combined.data,LOCATION == "Southern Basilan",select=c(1:14,16,17,18,19))
cot <- subset(combined.data,LOCATION == "Cotabato",select=c(1:14,16,17,18,19))
isa <- subset(combined.data,LOCATION == "Isabela",select=c(1:14,16,17,18,19))
mar <- subset(combined.data,LOCATION == "Marawi",select=c(1:14,16,17,18,19))
sul <- subset(combined.data,LOCATION == "Sulu",select=c(1:14,16,17,18,19))
zam <- subset(combined.data,LOCATION == "Zamboanga",select=c(1:14,16,17,18,19))

# Model
basilan.combined1 <- lm(X2 ~ X1+X3+X4+X5+X6+X7+X8+X9+X10+X11+X12+X14+
                        X1:X7+X1:X8+X1:X10+X1:X11+X3:X6+X3:X7+
                        X5:X9+X5:X10+X5:X11+X5:X12+X6:X7+
                        X7:X9+X7:X10+X7:X12+X8:X14+X9:X10+
                        X10:X11+X10:X14+
                        factor(RELIGION)+factor(WAVE)+
                        X1:factor(WAVE)+X4:factor(WAVE)+
                        X10:factor(WAVE)+X11:factor(WAVE)+X12:factor(WAVE),data=bas)
baslm <- summary(basilan.combined1)
bascoef <- c(rep(0,nrow(baslm$coefficients)))

cotabato.combined1 <- lm(X2 ~ X1+X3+X4+X6+X7+X9+X10+X11+X13+X14+
                         X3:X13+X4:X10+X7:X10+
                         factor(RELIGION)+factor(WAVE)+
                         X1:factor(WAVE)+X7:factor(WAVE)+
                         X9:factor(WAVE)+X10:factor(WAVE)+X11:factor(WAVE)+X14:factor(WAVE),data=cot)
```

```
cotlm <- summary(cotabato.combined1)
cotcoef <- c(rep(0,nrow(cotlm$coefficients)))

isabela.combined1 <- lm(X2 ~ X1+X3+X4+X5+X6+X7+X9+X10+X12+X14+
                        X1:X4+X1:X5+X3:X12+X4:X10+X6:X9+
                        X7:X10+X7:X14+
                        factor(RELIGION)+factor(WAVE)+

X1:factor(WAVE)+X3:factor(WAVE)+X4:factor(WAVE)+X5:factor(WAVE)+X6:factor(WAVE)+
                        X10:factor(WAVE)+X12:factor(WAVE),data=isa)
isalm <- summary(isabela.combined1)
isacoef <- c(rep(0,nrow(isalm$coefficients)))

marawi.combined1 <- lm(X2 ~ X4+X6+X7+X8+X10+X12+X13+
                       X10:X13+
                       factor(CLASS)+factor(WAVE)+
                       X4:factor(WAVE)+X6:factor(WAVE)+X10:factor(WAVE),data=mar)
marlm <- summary(marawi.combined1)
marcoef <- c(rep(0,nrow(marlm$coefficients)))

sulu.combined1 <- lm(X2 ~ X1+X3+X4+X5+X6+X7+X8+X10+X11+X12+X13+X14+
                     X1:X3+X1:X7+X3:X13+X4:X12+X5:X7+
                     X6:X12+X7:X12+X8:X13+X11:X12+
                     factor(WAVE)+
                     X4:factor(WAVE)+X8:factor(WAVE)+
                     X10:factor(WAVE)+X11:factor(WAVE)+X13:factor(WAVE),data=sul)
sullm <- summary(sulu.combined1)
sulcoef <- c(rep(0,nrow(sullm$coefficients)))

zamboanga.combined1 <- lm(X2 ~ X1+X3+X4+X6+X7+X8+X10+X12+X13+X14+
                          X1:X10+X3:X10+X4:X10+X6:X7+
                          X7:X14+X8:X12+X10:X12+X10:X13+
                          factor(RELIGION)+factor(WAVE)+
                          X1:factor(WAVE)+X10:factor(WAVE),data=zam)
zamlm <- summary(zamboanga.combined1)
zamcoef <- c(rep(0,nrow(zamlm$coefficients)))

# Loop and create vector of coefficients
for (i in 1:nrow(baslm$coefficients)){
  bascoef[i] <- baslm$coefficients[i]
}

for (i in 1:nrow(cotlm$coefficients)){
  cotcoef[i] <- cotlm$coefficients[i]
}

for (i in 1:nrow(isalm$coefficients)){
  isacoef[i] <- isalm$coefficients[i]
}

for (i in 1:nrow(marlm$coefficients)){
  marcoef[i] <- marlm$coefficients[i]
}

for (i in 1:nrow(sullm$coefficients)){
```

```
  sulcoef[i] <- sullm$coefficients[i]
}

for (i in 1:nrow(zamlm$coefficients)){
  zamcoef[i] <- zamlm$coefficients[i]
}

x1.bas <-
bascoef[2]+(bascoef[17]*mean(bas$X7))+(bascoef[18]*mean(bas$X8))+(bascoef[19]*mean(bas$X10))+(bascoef[2
0]*mean(bas$X11))
x3.bas <- bascoef[3]+(bascoef[21]*mean(bas$X6))+(bascoef[22]*mean(bas$X7))
x4.bas <- bascoef[4]
x5.bas <-
bascoef[5]+(bascoef[23]*mean(bas$X9))+(bascoef[24]*mean(bas$X10))+(bascoef[25]*mean(bas$X11))+(bascoef[
26]*mean(bas$X12))
x6.bas <- bascoef[6]+(bascoef[27]*mean(bas$X7))
x7.bas <-
bascoef[7]+(bascoef[17]*mean(bas$X1))+(bascoef[22]*mean(bas$X3))+(bascoef[27]*mean(bas$X6))+(bascoef[28
]*mean(bas$X9))+(bascoef[29]*mean(bas$X10))+(bascoef[30]*mean(bas$X12))
x8.bas <- bascoef[8]+(bascoef[18]*mean(bas$X1))+(bascoef[31]*mean(bas$X14))
x9.bas <- bascoef[9]+(bascoef[23]*mean(bas$X5))+(bascoef[28]*mean(bas$X7))+(bascoef[32]*mean(bas$X10))
x10.bas <-
bascoef[10]+(bascoef[19]*mean(bas$X1))+(bascoef[24]*mean(bas$X5))+(bascoef[29]*mean(bas$X7))+(bascoef[3
2]*mean(bas$X9))+(bascoef[33]*mean(bas$X11))+(bascoef[34]*mean(bas$X14))
x11.bas <- bascoef[11]+(bascoef[20]*mean(bas$X1))+(bascoef[25]*mean(bas$X5))+(bascoef[33]*mean(bas$X10))
x12.bas <- bascoef[12]+(bascoef[26]*mean(bas$X5))+(bascoef[30]*mean(bas$X7))
x14.bas <- bascoef[13]+(bascoef[31]*mean(bas$X8))+(bascoef[34]*mean(bas$X10))
test.bas <- c(x1.bas,x3.bas,x4.bas,x5.bas,x6.bas,x7.bas,x8.bas,x9.bas,x10.bas,x11.bas,x12.bas,x14.bas)

x1.cot <- cotcoef[2]
x3.cot <- cotcoef[3]+(cotcoef[15]*mean(cot$X13))
x4.cot <- cotcoef[4]+(cotcoef[16]*mean(cot$X10))
x6.cot <- cotcoef[5]
x7.cot <- cotcoef[6]+(cotcoef[17]*mean(cot$X10))
x9.cot <- cotcoef[7]
x10.cot <- cotcoef[8]+(cotcoef[16]*mean(cot$X4))+(cotcoef[17]*mean(cot$X7))
x11.cot <- cotcoef[9]
x13.cot <- cotcoef[10]+(cotcoef[15]*mean(cot$X3))
x14.cot <- cotcoef[11]
test.cot <- c(x1.cot,x3.cot,x4.cot,x6.cot,x7.cot,x9.cot,x10.cot,x11.cot,x13.cot,x14.cot)

x1.isa <- isacoef[2]+(isacoef[15]*mean(isa$X4))+(isacoef[16]*mean(isa$X5))
x3.isa <- isacoef[3]+(isacoef[17]*mean(isa$X12))
x4.isa <- isacoef[4]+(isacoef[15]*mean(isa$X1))+(isacoef[18]*mean(isa$X10))
x5.isa <- isacoef[5]+(isacoef[16]*mean(isa$X1))
x6.isa <- isacoef[6]+(isacoef[19]*mean(isa$X9))
x7.isa <- isacoef[7]+(isacoef[20]*mean(isa$X10))+(isacoef[21]*mean(isa$X14))
x9.isa <- isacoef[8]+(isacoef[19]*mean(isa$X6))
x10.isa <- isacoef[9]+(isacoef[18]*mean(isa$X4))+(isacoef[20]*mean(isa$X7))
x12.isa <- isacoef[10]+(isacoef[17]*mean(isa$X3))
x14.isa <- isacoef[11]+(isacoef[21]*mean(isa$X7))
test.isa <- c(x1.isa,x3.isa,x4.isa,x5.isa,x6.isa,x7.isa,x9.isa,x10.isa,x12.isa,x14.isa)

x4.mar <- marcoef[2]
x6.mar <- marcoef[3]
```

```
x7.mar <- marcoef[4]
x8.mar <- marcoef[5]
x10.mar <- marcoef[6]+(marcoef[12]*mean(mar$X13))
x12.mar <- marcoef[7]
x13.mar <- marcoef[8]+(marcoef[12]*mean(mar$X10))
test.mar <- c(x4.mar,x6.mar,x7.mar,x8.mar,x10.mar,x12.mar,x13.mar)

x1.sul <- sulcoef[2]+(sulcoef[16]*mean(sul$X3))+(sulcoef[17]*mean(sul$X7))
x3.sul <- sulcoef[3]+(sulcoef[16]*mean(sul$X1))+(sulcoef[18]*mean(sul$X13))
x4.sul <- sulcoef[4]+(sulcoef[19]*mean(sul$X12))
x5.sul <- sulcoef[5]+(sulcoef[20]*mean(sul$X7))
x6.sul <- sulcoef[6]+(sulcoef[21]*mean(sul$X12))
x7.sul <- sulcoef[7]+(sulcoef[17]*mean(sul$X1))+(sulcoef[20]*mean(sul$X5))+(sulcoef[22]*mean(sul$X12))
x8.sul <- sulcoef[8]+(sulcoef[23]*mean(sul$X13))
x10.sul <- sulcoef[9]
x11.sul <- sulcoef[10]+(sulcoef[24]*mean(sul$X12))
x12.sul <-
sulcoef[11]+(sulcoef[19]*mean(sul$X4))+(sulcoef[21]*mean(sul$X6))+(sulcoef[22]*mean(sul$X7))+(sulcoef[24]*
mean(sul$X11))
x13.sul <- sulcoef[12]+(sulcoef[18]*mean(sul$X3))+(sulcoef[23]*mean(sul$X8))
x14.sul <- sulcoef[13]
test.sul <- c(x1.sul,x3.sul,x4.sul,x5.sul,x6.sul,x7.sul,x8.sul,x10.sul,x11.sul,x12.sul,x13.sul,x14.sul)

x1.zam <- zamcoef[2]+(zamcoef[15]*mean(zam$X10))
x3.zam <- zamcoef[3]+(zamcoef[16]*mean(zam$X10))
x4.zam <- zamcoef[4]+(zamcoef[17]*mean(zam$X10))
x6.zam <- zamcoef[5]+(zamcoef[18]*mean(zam$X7))
x7.zam <- zamcoef[6]+(zamcoef[18]*mean(zam$X6))+(zamcoef[19]*mean(zam$X14))
x8.zam <- zamcoef[7]+(zamcoef[20]*mean(zam$X12))
x10.zam <-
zamcoef[8]+(zamcoef[15]*mean(zam$X1))+(zamcoef[16]*mean(zam$X3))+(zamcoef[17]*mean(zam$X4))+(zamc
oef[21]*mean(zam$X12))+(zamcoef[22]*mean(zam$X13))
x12.zam <- zamcoef[9]+(zamcoef[20]*mean(zam$X8))+(zamcoef[21]*mean(zam$X10))
x13.zam <- zamcoef[10]+(zamcoef[22]*mean(zam$X10))
x14.zam <- zamcoef[11]+(zamcoef[19]*mean(zam$X7))
test.zam <- c(x1.zam,x3.zam,x4.zam,x6.zam,x7.zam,x8.zam,x10.zam,x12.zam,x13.zam,x14.zam)

coefs <- c(test.bas,test.cot,test.isa,test.mar,test.sul,test.zam)

# Calculate factor means
factor.means.bas <-
c(mean(bas$X1),mean(bas$X3),mean(bas$X4),mean(bas$X5),mean(bas$X6),mean(bas$X7),mean(bas$X8),
        mean(bas$X9),mean(bas$X10),mean(bas$X11),mean(bas$X12),mean(bas$X14))
factor.means.cot <-
c(mean(bas$X1),mean(bas$X3),mean(bas$X4),mean(cot$X6),mean(cot$X7),mean(cot$X9),mean(cot$X10),
        mean(cot$X11),mean(bas$X13),mean(cot$X14))
factor.means.isa <-
c(mean(bas$X1),mean(bas$X3),mean(bas$X4),mean(isa$X5),mean(isa$X6),mean(isa$X7),mean(isa$X9),
        mean(isa$X10),mean(isa$X12),mean(isa$X14))
factor.means.mar <-
c(mean(mar$X4),mean(mar$X6),mean(mar$X7),mean(mar$X8),mean(mar$X10),mean(mar$X12),
        mean(mar$X13))
factor.means.sul <-
c(mean(sul$X1),mean(bas$X3),mean(sul$X4),mean(sul$X5),mean(bas$X6),mean(sul$X7),mean(sul$X8),
        mean(sul$X10),mean(sul$X11),mean(sul$X12),mean(bas$X13),mean(sul$X14))
```

```
factor.means.zam <-
c(mean(zam$X1),mean(zam$X3),mean(zam$X4),mean(zam$X6),mean(bas$X7),mean(zam$X8),mean(zam$X10),
                mean(zam$X12),mean(zam$X13),mean(zam$X14))
factor.means <-
c(factor.means.bas,factor.means.cot,factor.means.isa,factor.means.mar,factor.means.sul,factor.means.zam)
factnum <- factor(c("X1","X3","X4","X5","X6","X7","X8","X9","X10","X11","X12","X14",
          "X1","X3","X4","X6","X7","X9","X10","X11","X13","X14",
          "X1","X3","X4","X5","X6","X7","X9","X10","X12","X14",
          "X4","X6","X7","X8","X10","X12","X13",
          "X1","X3","X4","X5","X6","X7","X8","X10","X11","X12","X13","X14",
          "X1","X3","X4","X6","X7","X8","X10","X12","X13","X14"))
loc <-
factor(c("Basilan","Basilan","Basilan","Basilan","Basilan","Basilan","Basilan","Basilan","Basilan","Basilan","Basil
an","Basilan",

"Cotabato","Cotabato","Cotabato","Cotabato","Cotabato","Cotabato","Cotabato","Cotabato","Cotabato","Cotabato",
            "Isabela","Isabela","Isabela","Isabela","Isabela","Isabela","Isabela","Isabela","Isabela","Isabela",
            "Marawi","Marawi","Marawi","Marawi","Marawi","Marawi","Marawi",
            "Sulu","Sulu","Sulu","Sulu","Sulu","Sulu","Sulu","Sulu","Sulu","Sulu","Sulu",

"Zamboanga","Zamboanga","Zamboanga","Zamboanga","Zamboanga","Zamboanga","Zamboanga","Zamboanga","
Zamboanga","Zamboanga"))
pframe <- data.frame(cbind(coefs,factor.means,factnum,loc))

# Plot
with(pframe,plot(pframe[,1],pframe[,2],main="Key Driver Plot",xlab="Factor Regression Coefficients",
    ylab="Factor Mean Values",ylim=c(-1,1),xlim=c(-1,1),pch=as.integer(factnum),col=as.integer(loc)))

lab <- c("Lack of Government Corruption","Disapproval of Family Members Joining Ins","Awareness of Groups
(Gov & Ins)","Trust in Lesser Groups",
      "Approval of Family Members Joining Gov/Mil","Safety Provided by Local Groups","Trust in/Performance of
AFP","Threats to Peace",
      "Confidence in Institutions","Trust in/Performance of PNP","Satisfaction with Basic Services","Trust in/
Performance of CAFGU")

legend("bottomleft",lab,pch=1:length(levels(factnum)),cex=0.75)
legend("bottomright",as.character(levels(loc)),fill=1:length(levels(loc)))
abline(h=0,v=0,col="gray",lty="dotted")

#Plot Influence Graphs

bascoef.influ.pos <- c(test.bas[1],0,test.bas[c(3:6)],0,0,0,test.bas[10],0,0)
bascoef.influ.neg <- c(0,test.bas[2],0,0,0,0,test.bas[c(7:9)],0,test.bas[c(11:12)])
bascoef.influ <- matrix (rbind (bascoef.influ.pos,bascoef.influ.neg), nrow=2)
coef.names.bas <- c("Lack of Government Corruption","Trust in/Performance of AFP","Threats to
Peace","Confidence in Institutions","Trust in/Performance of PNP",
              "Satisfaction with Basic Services", "Trust in/ Performance of CAFGU","Trust in/Performance of GRP",
              "Disapproval of Family Members Joining Ins","Awareness of Groups (Gov & Ins)","Trust in Lesser
Groups","Safety Provided by Local Groups")
cotcoef.influ.pos <- c(test.cot[1:6],0,test.cot[8],0,0)
cotcoef.influ.neg <- c(0,0,0,0,0,0,0,test.cot[7],0,test.cot[c(9:10)])
cotcoef.influ <- matrix (rbind (cotcoef.influ.pos,cotcoef.influ.neg), nrow=2)
coef.names.cot <- c("Lack of Government Corruption","Trust in/Performance of AFP","Threats to Peace","Trust
in/Performance of PNP",
```

```
            "Satisfaction with Basic Services","Trust in/Performance of GRP","Disapproval of Family Members
Joining Ins",
            "Awareness of Groups (Gov & Ins)","Approval of Family Members Joining the Gov/Mil","Safety
Provided by Local Groups")
isacoef.influ.pos <- c(0,0,test.isa[c(3:7)],0,0,0)
isacoef.influ.neg <- c(test.isa[c(1:2)],0,0,0,0,0,test.isa[c(8:10)])
isacoef.influ <- matrix (rbind (isacoef.influ.pos,isacoef.influ.neg), nrow=2)
coef.names.isa <- c("Lack of Government Corruption","Trust in/Performance of AFP","Threats to
Peace","Confidence in Institutions",
            "Trust in/Performance of PNP","Satisfaction with Basic Services","Trust in/Performance of GRP",
            "Disapproval of Family Members Joining Ins","Trust in Lesser Groups","Safety Provided by Local
Groups")
marcoef.influ.pos <- c(0,0,0,0,0,0,0)
marcoef.influ.neg <- c(test.mar[c(1:7)])
marcoef.influ <- matrix (rbind (marcoef.influ.pos,marcoef.influ.neg), nrow=2)
coef.names.mar <- c("Threats to Peace","Trust in/Performance of PNP","Satisfaction with Basic Services","Trust
in/Performance of CAFGU",
            "Disapproval of Family Members Joining Ins","Trust in Lesser Groups","Approval of Family Members
Joining the Gov/Mil")
sulcoef.influ.pos <- c(test.sul[1],0,test.sul[c(3:6)],0,0,test.sul[9],0,0,0)
sulcoef.influ.neg <- c(0,test.sul[2],0,0,0,0,test.sul[c(7:8)],0,test.sul[c(10:12)])
sulcoef.influ <- matrix (rbind (sulcoef.influ.pos,sulcoef.influ.neg), nrow=2)
coef.names.sul <- c("Lack of Government Corruption","Trust in/Performance of AFP","Threats to
Peace","Confidence in Institutions","Trust in/Performance of PNP",
            "Satisfaction with Basic Services", "Trust in/ Performance of CAFGU","Disapproval of Family
Members Joining Ins",
            "Awareness of Groups (Gov & Ins)","Trust in Lesser Groups","Approval of Family Members Joining
Gov/Mil","Safety Provided by Local Groups")
zamcoef.influ.pos <- c(0,0,test.zam[c(3:4)],0,0,0,0,0,0)
zamcoef.influ.neg <- c(test.zam[c(1:2)],0,0,test.zam[c(5:10)])
zamcoef.influ <- matrix (rbind (zamcoef.influ.pos,zamcoef.influ.neg), nrow=2)
coef.names.zam <- c("Lack of Government Corruption","Trust in/Performance of AFP","Threats to Peace","Trust
in/Performance of PNP",
            "Satisfaction with Basic Services", "Trust in/ Performance of CAFGU","Disapproval of Family
Members Joining Ins",
            "Trust in Lesser Groups","Approval of Family Members Joining Gov/Mil","Safety Provided by Local
Groups")

par(mfcol=c(2,3))

barplot(bascoef.influ[1,],main="Southern Basilan",ylab="Strength / Direction of Relationship",
      ylim=c(-2,2),axes=FALSE,col="darkolivegreen",xlab="Factors")
barplot(bascoef.influ[2,],add=T,axes=FALSE,col="firebrick")
axis(side=2,at=c(-2,-1,0,1,2),labels=c("(--)","(-)","(0)","(+)","(++)"),las=2)
abline(h=c(-1,1),col="gray",lty="dotted")
text(c(0.7,1.9,3.1,4.3,5.5,6.7,7.9,9.1,10.3,11.5,12.7,13.9),-
1,labels=coef.names.bas,srt=71,adj=1,cex=0.75,xpd=TRUE,font=1)

barplot(cotcoef.influ[1,],main="Cotabato",ylab="Strength / Direction of Relationship",
      ylim=c(-2,2),axes=FALSE,col="darkolivegreen",xlab="Factors")
barplot(cotcoef.influ[2,],add=T,axes=FALSE,col="firebrick")
axis(side=2,at=c(-2,-1,0,1,2),labels=c("(--)","(-)","(0)","(+)","(++)"),las=2)
abline(h=c(-1,1),col="gray",lty="dotted")
text(c(0.7,1.9,3.1,4.3,5.5,6.7,7.9,9.1,10.3,11.5),-
0.7,labels=coef.names.cot,srt=71,adj=1,cex=0.75,xpd=TRUE,font=1)
```

```
barplot(isacoef.influ[1,],main="Isabela",ylab="Strength / Direction of Relationship",
      ylim=c(-2,2),axes=FALSE,col="darkolivegreen",xlab="Factors")
barplot(isacoef.influ[2,],add=T,axes=FALSE,col="firebrick")
axis(side=2,at=c(-2,-1,0,1,2),labels=c("(--)","(-)","(0)","(+)","(++)"),las=2)
abline(h=c(-1,1),col="gray",lty="dotted")
text(c(0.7,1.9,3.1,4.3,5.5,6.7,7.9,9.1,10.3,11.5),-
0.9,labels=coef.names.isa,srt=71,adj=1,cex=0.75,xpd=TRUE,font=1)

barplot(marcoef.influ[1,],main="Marawi",ylab="Strength / Direction of Relationship",
      ylim=c(-2,2),axes=FALSE,col="darkolivegreen",xlab="Factors")
barplot(marcoef.influ[2,],add=T,axes=FALSE,col="firebrick")
axis(side=2,at=c(-2,-1,0,1,2),labels=c("(--)","(-)","(0)","(+)","(++)"),las=2)
abline(h=c(-1,1),col="gray",lty="dotted")
text(c(0.7,1.9,3.1,4.3,5.5,6.7,7.9),-0.6,labels=coef.names.mar,srt=71,adj=1,cex=0.75,xpd=TRUE,font=1)

barplot(sulcoef.influ[1,],main="Sulu",ylab="Strength / Direction of Relationship",
      ylim=c(-2,2),axes=FALSE,col="darkolivegreen",xlab="Factors")
barplot(sulcoef.influ[2,],add=T,axes=FALSE,col="firebrick")
axis(side=2,at=c(-2,-1,0,1,2),labels=c("(--)","(-)","(0)","(+)","(++)"),las=2)
abline(h=c(-1,1),col="gray",lty="dotted")
text(c(0.7,1.9,3.1,4.3,5.5,6.7,7.9,9.1,10.3,11.5,12.7,13.9),-
0.7,labels=coef.names.sul,srt=71,adj=1,cex=0.75,xpd=TRUE,font=1)

barplot(zamcoef.influ[1,],main="Zamboanga",ylab="Strength / Direction of Relationship",
      ylim=c(-2,2),axes=FALSE,col="darkolivegreen",xlab="Factors")
barplot(zamcoef.influ[2,],add=T,axes=FALSE,col="firebrick")
axis(side=2,at=c(-2,-1,0,1,2),labels=c("(--)","(-)","(0)","(+)","(++)"),las=2)
abline(h=c(-1,1),col="gray",lty="dotted")
text(c(0.7,1.9,3.1,4.3,5.5,6.7,7.9,9.1,10.3,11.5),-
0.9,labels=coef.names.zam,srt=71,adj=1,cex=0.75,xpd=TRUE,font=1)
```

APPENDIX G. SURVEY IMPROVEMENT RECOMMENDATIONS (WAVE 5)

1. After working with the Project ACHILLES surveys and data, we propose a number of changes for possible incorporation in future survey waves. These include technical improvements, such as response scale, skip pattern, question organization, and wording adjustments, as well as useful question additions. Each of these is discussed in more detail in the paragraphs to follow.
2. Closed-ended Question Response Scale Adjustments. In reviewing the response options to each of the questions, we find a number of areas for improvement. For example, there are some questions with Likert scale response options in which the scale (at least in English) seems unbalanced. We also find a number of unidirectional response scales that inappropriately have a neutral-sounding response option in the middle. Our concern is that these types of scales may inadvertently introduce a bias into responses. Below are specific examples and possible solutions.[1]
    a. The response scales for Q14[2] and similar questions seem unbalanced, at least in terms of their English translations, in the sense that the negative side of the scale is not as extreme as the positive side.
        i. That is, as translated into English, the response scale is Excellent, Very Good, Neither Good nor Poor, Fair, and Poor.
        ii. A quick check in Google Translate suggests that the scale may be unbalanced in Tagalog as well as English:

Tagalog	*English (via Google Translate)*
Pinakamahusay	Best
Talagang mahusay	Really good
Maaaring mahusay o hindi mahusay	Be good or not good
Katamtaman ang husay	Modest settled
Hindi mahusay	Poorly

        iii. A better response scale would be Very Good, Good, Neither Good nor Poor, Poor, Very Poor.
    b. Similarly, the response scale for Q16 does not seem well balanced in the sense that the distance between the options does not seem equal. Currently

[1] Note that these examples are not intended to be comprehensive. Should any or all be adopted, a careful review of the entire instrument is recommended to ensure all instances are captured.

[2] Question numbers correspond to the Wave 4 instrument.

it is Excellent, Very Well, Neither Well or Not Well, Not Very Well, and Not Well at All.

i. A better option, if the desire is to keep it on a 5-point Likert scale, would be Very Well, Well, Neither Well or Poorly, Poorly, and Very Poorly.

ii. Alternately, if there is an issue with respondents rating an agency as Poorly or Very Poorly, the response scale could be changed to a unidirectional rating scale like: Excellent, Very Well, Well, Not Very Well, and Not Well at All.

c. In a related vein, the scale on questions like 15, 17, 18-34, 106, etc., are unidirectional, not bidirectional, but the middle response is (incorrectly) written to be like a neutral on an odd-point Likert scale.

i. That is, as translated into English, the response scale for Q15 is Extremely Strongly, Very Strongly, Neither Strong or Not Strong, Not Very Strongly, Not Strongly at All.

ii. A better response scale would be Extremely Strongly, Very Strongly, Strongly, Not Very Strongly, Not Strongly at All.

d. The response scale for Q65 also does not feel balanced, in this case perhaps biased towards the unsafe side. That is, the response scale (in English) is currently Very Safe, Fairly Safe, Not Very Safe, and Not Safe at All.

i. It seems to us a more balanced bidirectional scale would be Very Safe, Safe, Neither Safe nor Unsafe, Unsafe, and Very Unsafe.

ii. Alternatively, a better unidirectional scale would be Very Safe, Safe, Somewhat Safe, Not Very Safe, and Not Safe at All.

e. The Q66 and Q67 response scales are definitely unbalanced, with two positive responses and only one negative (along with a neutral). As written, they will very likely introduce a positive bias in the survey responses.

Recommendation. We recommend a careful review of all the response scales throughout the survey instrument. In all languages, the Likert scale responses should be evenly balanced on each side of the neutral point in the scale, both in terms of the number of responses on each side and in terms of how they are phrased. Unidirectional response scales should not have a neutral-like response in the middle and the specific responses should proceed in an even way from one end of the scale to the other.

3. <u>Open-ended Question Response Scale Improvements</u>. In Wave 5 it should be possible to turn many of the previously open-ended questions into partially closed questions. This would greatly facilitate analyses and communication of the results.

a. That is, as currently written, there are many open-ended questions that must be coded in order to be quantified.

b. Specific questions include: Q8-13, Q40, Q52, Q54, Q56, Q64, Q69-Q76, Q93, Q94b-d

Recommendation. Tally up the most frequently given responses in the Wave 3 and 4 data and use the list to either:

- Develop a set of pre-coded responses for the interviewers so that the results can easily be tabulated, or
- Revise these questions from open-ended to partially closed questions.
- In either case, include an "other" response to allow for additional input not contained in the list.

4. Skip Pattern Changes. In Wave 5 we would like to have a couple of skip patterns removed from the survey so we can observe the relevant data from all respondents. In particular:

    a. We would like questions 90-95 to be asked of all respondents so we can compare and contrast how Muslim and non-Muslim respond to these questions. Such a comparison could be very illuminating and provide useful insights into community differences.

Note that, as the questions are currently written, they can be asked of anyone; it's just a matter of removing the skip instructions at the beginning of the section. Of course it's likely that non-Muslims will more frequently answer "don't know," but some non-Muslims who live in Mindanao are likely to have relevant knowledge and/or may have some interesting opinions about Sharia law.

Recommendation. Remove the skip logic for Section XII and have all respondents answer these questions.

    b. Q63 skips Q64 for those who say they feel free to voice their opinions and needs to barangay officials. However, it seems to us like the more interesting information is from those who don't feel free to express their opinions and needs.

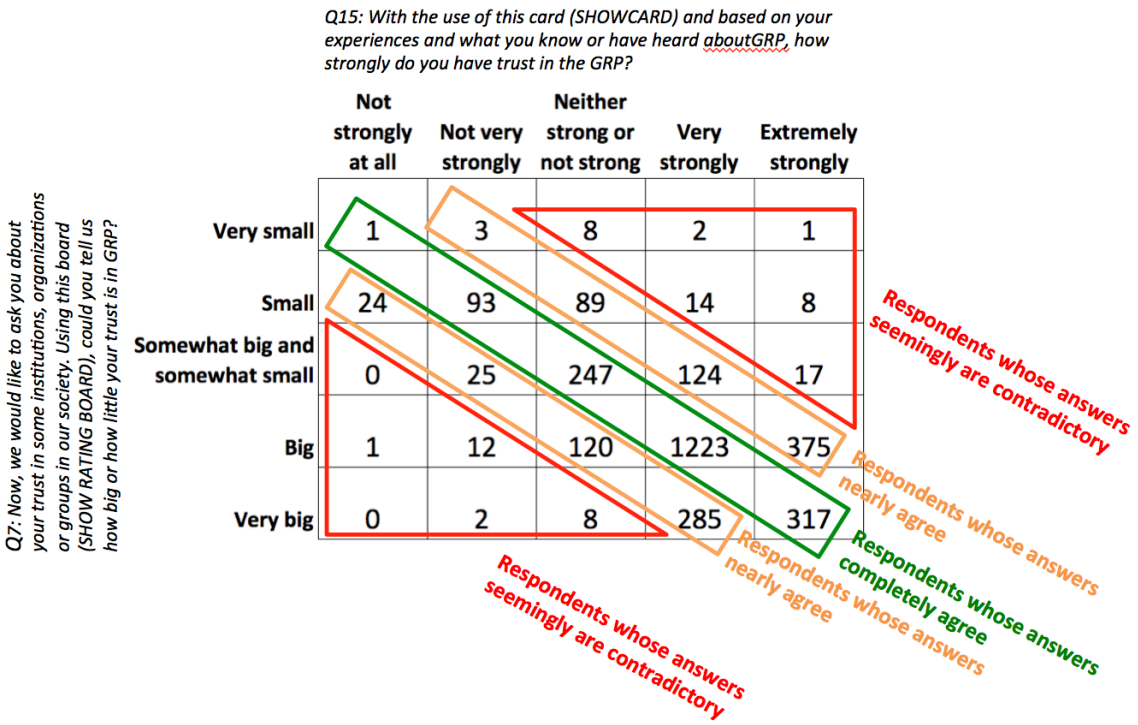
Recommendation. Either: (i) add in an additional skip from Q63 for those who say "no" to a question that asks, "Why do you not feel free to voice your opinions and needs to the officials in your barangay?" or (ii) if an additional question cannot be added, replace the existing Q64 with the this question and skip logic.

5. Question Grouping/Ordering. In Q7 we are somewhat concerned that randomly alternating between asking about extremist and/or rebel groups and government-affiliated organizations *may* lead some respondents to inadvertently give the wrong answer. That is, presumably it is likely that those who say their trust in rebel/extremist groups is "very big" or "big" will say their trust in the government and government affiliated organization is "small" or "very small" and vice versa, but

when alternating responses between the types of groups they may inadvertently give an answer at the wrong end of the scale.

a. If this was a self-administered survey then this switching back and forth would undoubtedly introduce respondent error. Because this is interviewer-administered, the potential for error is likely reduced (depending on how well-trained and careful the interviewers are), but there may still be at least some error.

b. The data suggests this may be occurring on a limited basis. The figure below compares the Wave 4 results of Q7g to Q15GRP, where Q15GRP is very similar to Q7g but not asked in the context of the all the other rebel/extremist organizations. In the figure we see, for example, that 50 respondents indicated somewhat to extremely strong trust in the government for Q15 (the upper right red triangle) but said the opposite for Q7. If we assume the Q15 results reflect their actual opinion, these results suggest the responses to Q7 for these respondents may be in error. In a similar way, the 23 respondent responses to Q7 in the lower left red triangle may also be in error.



c. *Recommendation.* The seemingly contradictory responses cannot be resolved or adjudicated in our analysis. They may represent actual contradictory respondent opinions or they may be artifacts of the way Q7 is posed (which we think is more likely). Thus, we recommend that Q7 be split in two, with one part asking only about the government, government-

affiliated, and international organizations and the second part only asking about rebel and extremist groups. If there is some concern about the latter being sensitive, move that set of questions to later in the survey.

6. Translation Improvements. In Q39, we believe the English translation should read something like "Are there any members of your family should be in treatment but are not currently being treated?" and Q40 should read something like "Why are the family members who should be in treatment not currently being treated? What else? Is there anything else?" In particular, the words "studying" and "enrolled" in the current translations for Q39 and Q40 do not seem to follow from Q37 and Q38.

Recommendation. Appropriately correct the English translations for Q39 and Q40.

7. Additional questions. While we recognize that it is important to control the length of survey instruments so as not to place too much of a burden on the respondents, we nonetheless have a number of suggested question additions. Adding these questions will significantly improve the analytical usefulness of the resulting data.

In particular, one of our analytical goals is to develop causal models of what affects citizen's trust in various organizations, particularly the GRP, AFP, PNP, and particular extremist organizations. The results of such models will be useful for guiding policy decisions about where to apply resources and make policy changes in order improve (or degrade) trust.

Accepted social science research, and our empirical research using survey data from Africa, show that trust is a function of ability, integrity, benevolence, reputation, and trust propensity. The Wave 4 survey instrument has a lot of questions related to ability (1, 2, 14, 16, 17, 18, 20-25, 28, 29-34, 35a-d, 41, 63, 65, 66-68, 80a-d) and some related to trust (6-7, 15, 42), but almost none on the other characteristics.

In addition, the survey has some questions about "confidence," but this is an ill-defined concept. (E.g., what does it mean when a respondent says s/he has confidence in the GRP, for example? Is it confidence in their ability to govern? It could just as well be confidence that an inept or corrupt government will continue to be inept or corrupt.)

Recommendation. Make the following changes and additions to the survey questions:

a. In addition to separating out the organizations listed in Q7 per paragraph 5 above, also add in the individuals and organizations listed in Q57 and Q58 so that respondents are asked about their trust in a broader and more extensive list. Thus, Q6 and Q7 would now be:

		Q6a		Q7a						
SHUFFLE CARDS – RATING BOARD 1		AWARE	NOT AWARE	VB	B	MB/ MS	S	VS/ NONE	DK	R
a.	Government of the Republic of the Philippines or GRP	1	2	5	4	3	2	1	8	9
b.	Armed Forces of the Philippines or AFP	1	2	5	4	3	2	1	8	9
c.	Philippine National Police or PNP	1	2	5	4	3	2	1	8	9

d.	PNP-Special Action Force	1	2	5	4	3	2	1	8	9
e.	Philippine Marines	1	2	5	4	3	2	1	8	9
f.	Philippine Air Forces or PAF	1	2	5	4	3	2	1	8	9
g.	CAFGU (Citizens Armed Forces Geographical Unit)	1	2	5	4	3	2	1	8	9
h.	Japan International Cooperation Agency or JICA	1	2	5	4	3	2	1	8	9
i.	Australian Agency for International Development or AusAID	1	2	5	4	3	2	1	8	9
j.	United States Agency for International Development or USAID	1	2	5	4	3	2	1	8	9
k.	United States Government or USG/US Forces	1	2	5	4	3	2	1	8	9
		Q6b		Q7b						
	SHUFFLE CARDS – RATING BOARD 2	AWARE	NOT AWARE	VB	B	MB/ MS	S	VS/ NONE	DK	R
a.	PRESIDENTE AT ANG KANYANG GABINETE *(President and his cabinet)*	1	2	5	4	3	2	1	8	9
b.	SENADO *(Senate)*	1	2	5	4	3	2	1	8	9
c.	KONGRESO *(Congress)*	1	2	5	4	3	2	1	8	9
d.	SISTEMANG LEGAL AT MGA KORTE *(Legal system/courts)*	1	2	5	4	3	2	1	8	9
e.	GOBYERNONG PANLALAWIGAN O PANGPROBINSYA *(Provincial government)*	1	2	5	4	3	2	1	8	9
f.	GOBYERNONG PANGLUNGSOD *(City/town government)*	1	2	5	4	3	2	1	8	9
g.	BARANGAY	1	2	5	4	3	2	1	8	9
h.	MGA TAUHAN O NAGTATRABAHO SA GOBYERNO *(Civil service/government workers)*	1	2	5	4	3	2	1	8	9
i.	MGA LIDER NA PANGRELIHIYON/ RELIGIOUS LEADERSTULAD NG PARI, ULAMA *(Religious leaders like priests, Ulamas)*	1	2	5	4	3	2	1	8	9

		Q6c		Q7c						
	SHUFFLE CARDS – RATING BOARD 3	AWARE	NOT AWARE	VB	B	MB/ MS	S	VS/ NONE	DK	R
a.	Abu Sayyaf Group or ASG	1	2	5	4	3	2	1	8	9
b.	Al-Qaida	1	2	5	4	3	2	1	8	9
c.	BIFF (Bangsamoro Islamic Freedom Fighter)	1	2	5	4	3	2	1	8	9
d.	Jemaah Islamiyah or JI	1	2	5	4	3	2	1	8	9
e.	Moro Islamic Liberation Front or MILF	1	2	5	4	3	2	1	8	9
f.	Moro National Liberation Front or MNLF	1	2	5	4	3	2	1	8	9

g.	New People's Army or NPA	1	2	5	4	3	2	1	8	9

b. Also, the same combined list of organizations from new Q7 will be used to revise Q57 and Q58. However, instead of the current generic "confidence" question, it will be replaced with three distinct and specific types of confidence ratings:

i. "Please tell me whether you have a GREAT DEAL, A FAIR AMOUNT, NOT VERY MUCH, OR NO CONFIDENCE AT ALL that (MENTION INSTITUTION) is acting today in the best interests of your community?

ii. "Please tell me whether you have a GREAT DEAL, A FAIR AMOUNT, NOT VERY MUCH, OR NO CONFIDENCE AT ALL that (MENTION INSTITUTION) has acted in the best interests of your community in the past?

iii. "Please tell me whether you have a GREAT DEAL, A FAIR AMOUNT, NOT VERY MUCH, OR NO CONFIDENCE AT ALL that (MENTION INSTITUTION) adheres to or operates according to a set of principles that you find acceptable?

These new questions both eliminate the ambiguity of the current questions and they more directly get at the concepts of benevolence, integrity, and reputation.

So, the current Qs 57 and 58 will be replaced with three questions (i, ii, and iii above). Each would have the following response sets:

		RATING BOARD					
	SHUFFLE CARDS/RATING BOARD 1	NAPAKALA-KING PAGTITIWALA *(Great deal)*	KATAMTA-MANG PAGTITIWALA *(Fair amount)*	WALANG GAANONG PAGTITIWALA *(Not very much)*	TALAGANG WALANG TIWALA *(None at all)*	DK	R
a.	Government of the Republic of the Philippines or GRP	1	2	3	4	8	9
b.	Armed Forces of the Philippines or AFP	1	2	3	4	8	9
c.	Philippine National Police or PNP	1	2	3	4	8	9
d.	PNP-Special Action Force	1	2	3	4	8	9
e.	Philippine Marines	1	2	3	4	8	9
f.	Philippine Air Forces or PAF	1	2	3	4	8	9
g.	CAFGU (Citizens Armed Forces Geographical Unit)	1	2	3	4	8	9
h.	Japan International Cooperation Agency or JICA	1	2	3	4	8	9
i.	Australian Agency for International Development or AusAID	1	2	3	4	8	9
j.	United States Agency for International Development or USAID	1	2	3	4	8	9
k.	United States Government or USG/US Forces	1	2	3	4	8	9

		RATING BOARD					
	SHUFFLE CARDS/RATING BOARD 2	NAPAKALA-KING PAGTITIWALA *(Great deal)*	KATAMTA-MANG PAGTITIWALA *(Fair amount)*	WALANG GAANONG PAGTITIWALA *(Not very much)*	TALAGANG WALANG TIWALA *(None at all)*	DK	R
a.	PRESIDENTE AT ANG KANYANG GABINETE *(President and his cabinet)*	1	2	3	4	8	9
b.	SENADO *(Senate)*	1	2	3	4	8	9
c.	KONGRESO *(Congress)*	1	2	3	4	8	9
d.	SISTEMANG LEGAL AT MGA KORTE *(Legal system/courts)*	1	2	3	4	8	9
e.	GOBYERNONG PANLALAWIGAN O PANGPROBINSYA *(Provincial government)*	1	2	3	4	8	9
f.	GOBYERNONG PANGLUNGSOD *(City/town government)*	1	2	3	4	8	9
g.	BARANGAY	1	2	3	4	8	9
h.	MGA TAUHAN O NAGTATRABAHO SA GOBYERNO *(Civil service/government workers)*	1	2	3	4	8	9
i.	MGA LIDER NA PANGRELIHIYON/ RELIGIOUS LEADERSTULAD NG PARI, ULAMA *(Religious leaders like priests, Ulamas)*	1	2	3	4	8	9

		RATING BOARD					
	SHUFFLE CARDS/RATING BOARD 3	NAPAKALA-KING PAGTITIWALA *(Great deal)*	KATAMTA-MANG PAGTITIWALA *(Fair amount)*	WALANG GAANONG PAGTITIWALA *(Not very much)*	TALAGANG WALANG TIWALA *(None at all)*	DK	R
a.	Abu Sayyaf Group or ASG	1	2	3	4	8	9
b.	Al-Qaida	1	2	3	4	8	9
c.	BIFF (Bangsamoro Islamic Freedom Fighter)	1	2	3	4	8	9
d.	Jemaah Islamiyah or JI	1	2	3	4	8	9
e.	Moro Islamic Liberation Front or MILF	1	2	3	4	8	9
f.	Moro National Liberation Front or MNLF	1	2	3	4	8	9
g.	New People's Army or NPA	1	2	3	4	8	9

c. In order to assess trustor propensity, add in the following new questions (with response scale "A lot," "A fair amount," "A little," and "Not at all"):

i. "How much do you trust your relatives?"
ii. "How much do you trust people from your barangay?"
iii. "How much do you trust people from your ethnic group?"
iv. "How much do you trust people who share your religion?"

v. "How much would you trust a person you just met?"
vi. "How much do you trust people from other barangays?"
vii. "How much do you trust people from other ethnic groups?"
viii. "How much do you trust people who practice a different religion?"

d. In terms of measuring satisfaction with basic services and infrastructure, it would be useful to add a question in addition to Q35 that asks respondents whether the services and infrastructure have improved or gotten worse over the past year. A question following Q35 could be: "For each basic services previously mentioned, would you say [SERVICE] that your barangay or community receives is MUCH BETTER, BETTER, NETIHER BETTER NOR WORSE, WORSE or MUCH WORSE now compared to a year ago?"

8. Questions That Can Be Deleted. Finally, for our analytical purposes, there are a number of questions in the survey that we do not need. If they are not being used by others, then we recommend they can be deleted.

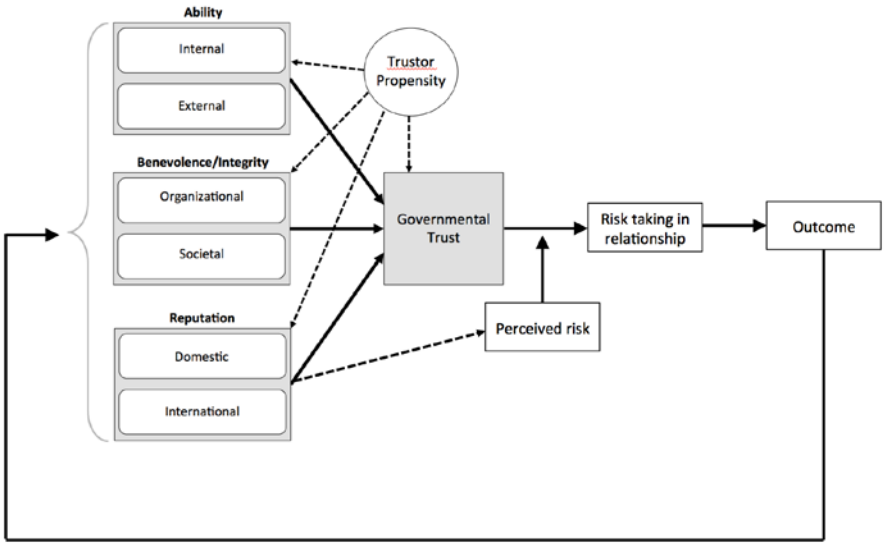
They are: Q3, Q4, Q5a, Q5b, Q37-Q40, Q43-Q47, Q49, Q54-Q56, Q82-Q85, Q89

APPENDIX H. SURVEY IMPROVEMENT RECOMMENDATIONS (WAVE 6)

9. Purpose. This memo proposes a number of survey changes to improve the ability of SPPPS to measure and model trust. Better trust models will allow JSOTF-P to determine courses of action (COAs) for enhancing local populations' trust in government organizations (AFP, PNP, etc.) as well as potentially degrading trust in insurgent organizations. As David Kilcullen says, trust building is the "true main effort; everything else is secondary."[3]

10. Background. The most celebrated social science model of trust generation is Mayer et al.'s Integrative Model of Organizational Trust.[4] The Mayer et al. model is focused on trust between individuals. Recently, Fricker, Kulzy, and Combs proposed a generalization of the Mayer et al. model for trust between citizens and organizations, particularly government organizations.[5]

    The figure below illustrates Fricker, Kulzy, and Combs' Revised Integrative Model of Governmental Trust.[6]



[3] Kilcullen, D. (2010). *Counterinsurgency*, Oxford University Press, p. 37. (See also U.S. Army Tactics in Counterinsurgency Field Manual, FM-3-24.2 Appendix C, 2009.)

[4] Mayer, R.C., J.H. Davis and F.D. Schoorman (1995). An Integrative Model of Organizational Trust. *Academy of Management Review*, **20**, 709-734.

[5] Fricker, R.D., Jr., W.W. Kulzy and D.J.Y. Combs (2013). Exploring the Integrative Model of Organizational Trust as a Framework for Understanding Trust in Government. In submission to *Journal of Applied Psychology*.

[6] Note that this model applies equally well to insurgent organizations: simply replace the term "governmental" with "insurgent organization."

This model, which is supported by our empirical research using AFRICOM survey data on countries from the Sahel region of Africa,[3,7] show that trust is a function of ability, integrity, benevolence, reputation, and trust propensity.

Briefly, these terms are defined as follows.

- Ability: that group of skills, competencies, and characteristics that enable a party to have influence within some specific domain.
- Integrity: the perception that the trustee adheres to some set of principles that the trustor finds acceptable.
- Benevolence: the extent to which a trustor believes that a trustee wants to do good for the trustor.
- Reputation: perceptions of the organization, including popular understanding of the organization's goals and achievements.
- Trust propensity: how trusting an individual is in general.

The SPPPS Wave 4 survey instrument has a lot of questions related to ability (1, 2, 14, 16, 17, 18, 20-25, 28, 29-34, 35a-d, 41, 63, 65, 66-68, 80a-d) and some related to trust (6-7, 15, 42), but almost no questions about the other characteristics: integrity, benevolence, reputation, and trust propensity.

The survey does have some questions about "confidence," but this is an ill-defined concept. (E.g., what does it mean when a respondent says s/he has confidence in the GRP, for example? Is it confidence in their ability to govern? It could just as well be confidence that an inept or corrupt government will continue to be inept or corrupt.)

Current research using the SPPPS data from Waves 2-4 by MAJ Tom Deveans and LCDR Ben Cipperley, modeling trust in insurgent organizations, have achieved R^2 values on the order of 0.4 to 0.5. This suggests that 50 percent of the variation in trust in insurgent organizations is not explained, and much of this may be attributable to the fact that the current survey does not ask respondents about integrity, benevolence, reputation, and trust propensity and thus they cannot be modeled.

Note that the lack of these terms is more important to JSOTF-P than an academic exercise in model building. Information about each of the missing terms can provide JSOTF-P with useful and potentially actionable information. For example, it may be that the public's perception of the AFP's integrity and benevolence are as important as its capabilities. If so, if the goal is to improve public trust in the AFP, that implies a COA different than if all the public cares about is AFP abilities.

[7] Kulzy, Walter W., Lieutenant Commander, USN (2012). Modeling Indigenous Population Attitudes in Support of Irregular Warfare Analysis, Master's Thesis, Operations Research department, Naval Postgraduate School.

11. Recommended Changes. In order to better understand (and thereby provide useful COAs that impact) trust, we recommend the following changes and additions to the survey:

    e. Revise Q6 and Q7 as shown below. This revision: (i) adds in additional individuals and organizations (to mirror those listed in Q57 and Q58), and (ii) separates the questions about government and international organizations from insurgent organizations.

		Q6a		Q7a						
	SHUFFLE CARDS – RATING BOARD 1	AWARE	NOT AWARE	VB	B	MB/ MS	S	VS/ NONE	DK	R
a.	Government of the Republic of the Philippines or GRP	1	2	5	4	3	2	1	8	9
b.	Armed Forces of the Philippines or AFP	1	2	5	4	3	2	1	8	9
c.	Philippine National Police or PNP	1	2	5	4	3	2	1	8	9
d.	PNP-Special Action Force	1	2	5	4	3	2	1	8	9
e.	Philippine Marines	1	2	5	4	3	2	1	8	9
f.	Philippine Air Forces or PAF	1	2	5	4	3	2	1	8	9
g.	CAFGU (Citizens Armed Forces Geographical Unit)	1	2	5	4	3	2	1	8	9
h.	Japan International Cooperation Agency or JICA	1	2	5	4	3	2	1	8	9
i.	Australian Agency for International Development or AusAID	1	2	5	4	3	2	1	8	9
j.	United States Agency for International Development or USAID	1	2	5	4	3	2	1	8	9
k.	United States Government or USG/US Forces	1	2	5	4	3	2	1	8	9

		Q6b		Q7b						
	SHUFFLE CARDS – RATING BOARD 2	AWARE	NOT AWARE	VB	B	MB/ MS	S	VS/ NONE	DK	R
a.	PRESIDENTE AT ANG KANYANG GABINETE *(President and his cabinet)*	1	2	5	4	3	2	1	8	9
b.	SENADO *(Senate)*	1	2	5	4	3	2	1	8	9
c.	KONGRESO *(Congress)*	1	2	5	4	3	2	1	8	9
d.	SISTEMANG LEGAL AT MGA KORTE *(Legal system/courts)*	1	2	5	4	3	2	1	8	9
e.	GOBYERNONG PANLALAWIGAN O PANGPROBINSYA *(Provincial government)*	1	2	5	4	3	2	1	8	9
f.	GOBYERNONG PANGLUNGSOD *(City/town government)*	1	2	5	4	3	2	1	8	9
g.	BARANGAY	1	2	5	4	3	2	1	8	9

h.	MGA TAUHAN O NAGTATRABAHO SA GOBYERNO *(Civil service/government workers)*	1	2	5	4	3	2	1	8	9
i.	MGA LIDER NA PANGRELIHIYON/ RELIGIOUS LEADERSTULAD NG PARI, ULAMA *(Religious leaders like priests, Ulamas)*	1	2	5	4	3	2	1	8	9

		Q6c		Q7c						
	SHUFFLE CARDS – RATING BOARD 3	AWARE	NOT AWARE	VB	B	MB/ MS	S	VS/ NONE	DK	R
a.	Abu Sayyaf Group or ASG	1	2	5	4	3	2	1	8	9
b.	Al-Qaida	1	2	5	4	3	2	1	8	9
c.	BIFF (Bangsamoro Islamic Freedom Fighter)	1	2	5	4	3	2	1	8	9
d.	Jemaah Islamiyah or JI	1	2	5	4	3	2	1	8	9
e.	Moro Islamic Liberation Front or MILF	1	2	5	4	3	2	1	8	9
f.	Moro National Liberation Front or MNLF	1	2	5	4	3	2	1	8	9
g.	New People's Army or NPA	1	2	5	4	3	2	1	8	9

Then, revise Q57 and Q58 to ask about this same list of organiz ations and individuals (so that questions 7, 57, and 58 all ask about the same organizations and individuals). However, instead of the current generic "confidence" question, it will be replaced with three distinct and specific types of confidence ratings:

iv. "Please tell me whether you have a GREAT DEAL, A FAIR AMOUNT, NOT VERY MUCH, OR NO CONFIDENCE AT ALL that (MENTION INSTITUTION) is acting today in the best interests of your community?

v. "Please tell me whether you have a GREAT DEAL, A FAIR AMOUNT, NOT VERY MUCH, OR NO CONFIDENCE AT ALL that (MENTION INSTITUTION) has acted in the best interests of your community in the past?

vi. "Please tell me whether you have a GREAT DEAL, A FAIR AMOUNT, NOT VERY MUCH, OR NO CONFIDENCE AT ALL that (MENTION INSTITUTION) adheres to or operates according to a set of principles that you find acceptable?

These new questions both eliminate the ambiguity of the current questions and they more directly get at the concepts of benevolence, integrity, and reputation.

So, the current Qs 57 and 58 will be replaced with three questions (i, ii, and iii above). Each would have the following response sets:

		RATING BOARD					
	SHUFFLE CARDS/RATING BOARD 1	NAPAKALA-KING PAGTITIWALA *(Great deal)*	KATAMTA-MANG PAGTITIWALA *(Fair amount)*	WALANG GAANONG PAGTITIWALA *(Not very much)*	TALAGANG WALANG TIWALA *(None at all)*	DK	R
a.	Government of the Republic of the Philippines or GRP	1	2	3	4	8	9
b.	Armed Forces of the Philippines or AFP	1	2	3	4	8	9
c.	Philippine National Police or PNP	1	2	3	4	8	9
d.	PNP-Special Action Force	1	2	3	4	8	9
e.	Philippine Marines	1	2	3	4	8	9
f.	Philippine Air Forces or PAF	1	2	3	4	8	9
g.	CAFGU (Citizens Armed Forces Geographical Unit)	1	2	3	4	8	9
h.	Japan International Cooperation Agency or JICA	1	2	3	4	8	9
i.	Australian Agency for International Development or AusAID	1	2	3	4	8	9
j.	United States Agency for International Development or USAID	1	2	3	4	8	9
k.	United States Government or USG/US Forces	1	2	3	4	8	9

		RATING BOARD					
	SHUFFLE CARDS/RATING BOARD 2	NAPAKALA-KING PAGTITIWALA *(Great deal)*	KATAMTA-MANG PAGTITIWALA *(Fair amount)*	WALANG GAANONG PAGTITIWALA *(Not very much)*	TALAGANG WALANG TIWALA *(None at all)*	DK	R
a.	PRESIDENTE AT ANG KANYANG GABINETE *(President and his cabinet)*	1	2	3	4	8	9
b.	SENADO *(Senate)*	1	2	3	4	8	9
c.	KONGRESO *(Congress)*	1	2	3	4	8	9
d.	SISTEMANG LEGAL AT MGA KORTE *(Legal system/courts)*	1	2	3	4	8	9
e.	GOBYERNONG PANLALAWIGAN O PANGPROBINSYA *(Provincial government)*	1	2	3	4	8	9
f.	GOBYERNONG PANGLUNGSOD *(City/town government)*	1	2	3	4	8	9
g.	BARANGAY	1	2	3	4	8	9
h.	MGA TAUHAN O NAGTATRABAHO SA GOBYERNO *(Civil service/government workers)*	1	2	3	4	8	9
i.	MGA LIDER NA PANGRELIHIYON/ RELIGIOUS LEADERSTULAD NG PARI, ULAMA *(Religious leaders like priests, Ulamas)*	1	2	3	4	8	9

		RATING BOARD					
	SHUFFLE CARDS/RATING BOARD 3	NAPAKALA-KING PAGTITIWALA *(Great deal)*	KATAMTA-MANG PAGTITIWALA *(Fair amount)*	WALANG GAANONG PAGTITIWALA *(Not very much)*	TALAGANG WALANG TIWALA *(None at all)*	DK	R
a.	Abu Sayyaf Group or ASG	1	2	3	4	8	9
b.	Al-Qaida	1	2	3	4	8	9
c.	BIFF (Bangsamoro Islamic Freedom Fighter)	1	2	3	4	8	9
d.	Jemaah Islamiyah or JI	1	2	3	4	8	9
e.	Moro Islamic Liberation Front or MILF	1	2	3	4	8	9
f.	Moro National Liberation Front or MNLF	1	2	3	4	8	9
g.	New People's Army or NPA	1	2	3	4	8	9

f. In order to assess trustor propensity, add in the following new questions (with response scale "A lot," "A fair amount," "A little," and "Not at all"):

ix. "How much do you trust your relatives?"
x. "How much do you trust people from your barangay?"
xi. "How much do you trust people from your ethnic group?"
xii. "How much do you trust people who share your religion?"
xiii. "How much would you trust a person you just met?"
xiv. "How much do you trust people from other barangays?"
xv. "How much do you trust people from other ethnic groups?"
xvi. "How much do you trust people who practice a different religion?"

g. In terms of measuring satisfaction with basic services and infrastructure, it would be useful to add a question in addition to Q35 that asks respondents whether the services and infrastructure have improved or gotten worse over the past year. A question following Q35 could be: "For each basic services previously mentioned, would you say [SERVICE] that your barangay or community receives is MUCH BETTER, BETTER, NEITHER BETTER NOR WORSE, WORSE or MUCH WORSE now compared to a year ago?"

12. Additional Recommendations. In our 15 February memo we recommended a number of response scale, skip pattern, and open-ended question improvements. To the extent they were not incorporated into the Wave 5 instrument, we recommend they be reconsidered for Wave 6.

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